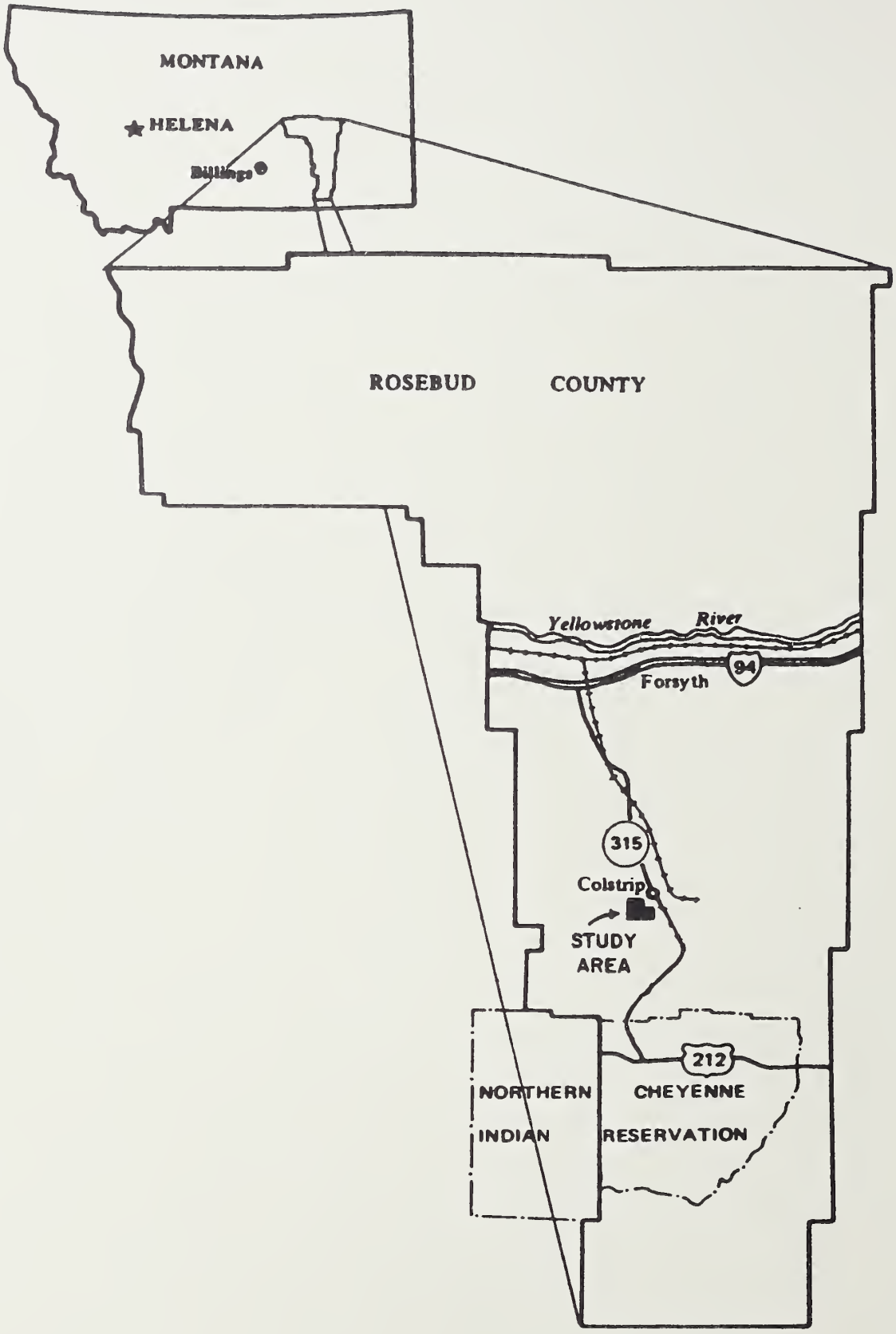
FINAL

Environmental Impact Statement

Western Energy Company's Rosebud Mine
Area B Extension



Final Environmental Impact Statement

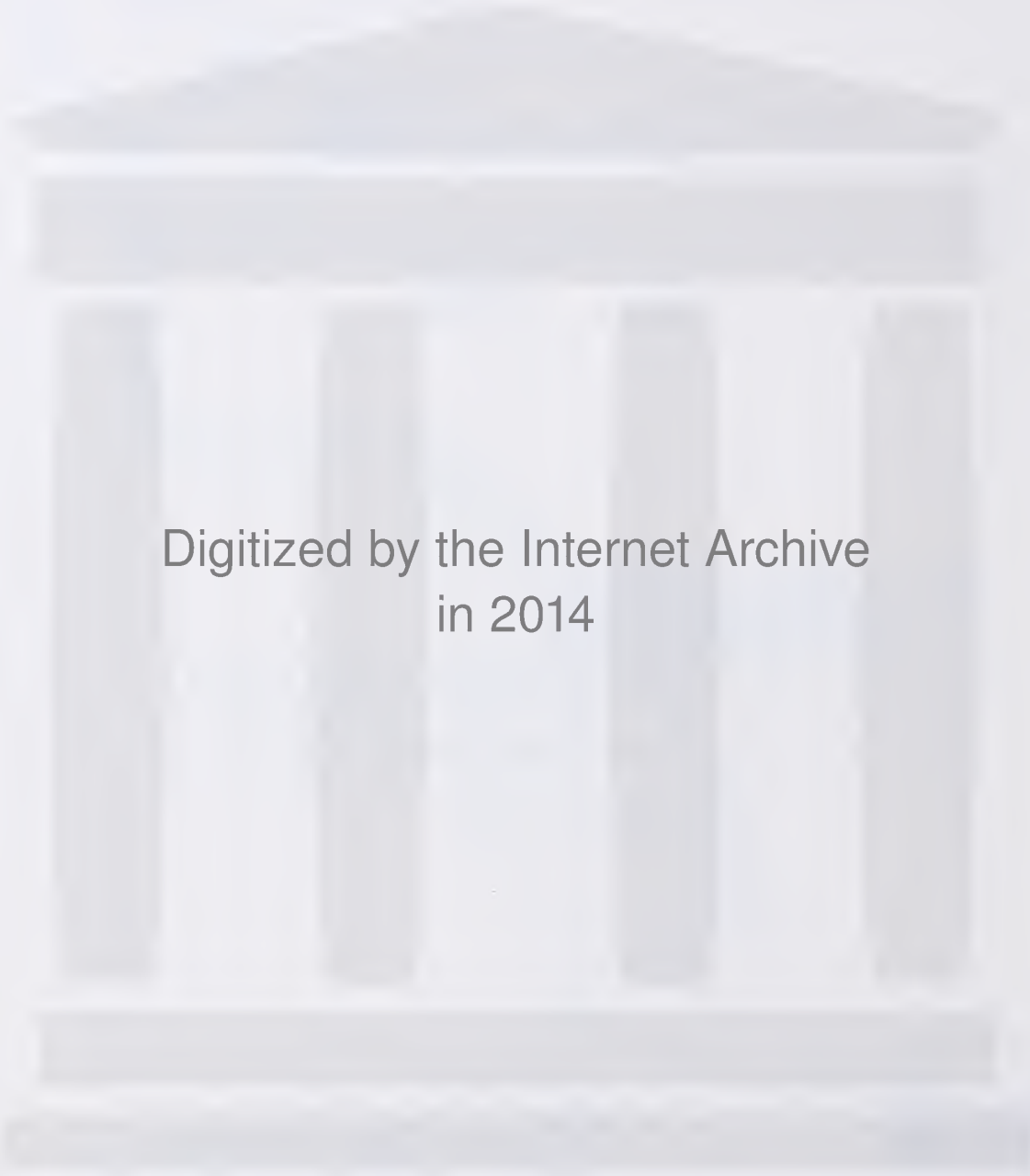
Western Energy Company's Rosebud Mine, Area B Extension

Prepared by the Montana Department of State Lands

Pursuant to the Montana Environmental Policy Act

November, 1980

Leo Berry, Jr., Commissioner
Montana Department of State Lands



SUMMARY

( ) Draft (x) Final Environmental Impact Statement

Montana Department of State Lands

Action being considered:

This document describes the environmental impacts that would result from approval of Western Energy Company's proposed amendment of the mining and reclamation plan for Area B of its Rosebud mine near Colstrip, Montana. Western Energy's Area B mine has disturbed 320 acres since 1976 under the provisions of permit #76003-A002. The company proposes to disturb an additional 1,083 acres over an 11-year period within a proposed 1,366-acre permit amendment area. The mine would produce about 3 million tons of coal annually through 1990.

The Commissioner of State Lands must decide whether to (1) approve the permit amendment or portions of the amendment as proposed, (2) approve the permit with stipulations, or (3) deny the amendment or portions of the amendment.

Summary of impacts:

- Geology--the proposed mine plan would minimize avoidable erosion owing to selective replacement of sandy-textured soils and complex slope configuration.

- Hydrology--impounding ephemeral runoff from Area B would alter the runoff pattern and slightly increase the salinity of East Fork Armells Creek. This could slightly lower agricultural productivity downstream for at least 2 decades. This impact could be minimized by releasing the impounded water as soon as sediment settles out.

- Climate--no detectable impacts are expected.

- Air quality--the mine would continue to contribute slightly to the already reduced air quality in the Colstrip "nonattainment area." Local residents and mine workers would occasionally be exposed to potentially hazardous concentrations of particulate. These impacts could be mitigated by enclosing coal conveyors and handling points.

- Soils and vegetation--the proposed reclamation plan would maximize salvage of appropriate soils and reseed with diverse, predominately native species.

- Wildlife--habitat that is more suitable is available nearby for the few game species that would be disturbed. No rare, threatened, or endangered species use the mine area.

- Social and economic conditions--Area B would not appreciably increase employment or population in Rosebud County. Adverse impacts from construction of Colstrip generating units 3 and 4 will far outweigh

the impact of Area B. The expansion of community services and facilities in Forsyth and Colstrip needed to accommodate the influx of workers for the generating units will also accommodate the small population increase attributable to Area B.

- Land use--the mine would not appreciably affect the existing land use pattern in Rosebud County. About 1,366 acres would be removed from livestock grazing during mine life.

- Transportation--traffic from the population associated with the mine would not exceed highway capacity, and coal shipments by unit train would not exceed rail capacity.

- Recreation--the mine area is privately owned and only occasionally used for outdoor recreation, and similar undisturbed areas are available nearby. The mine would continue to contribute slightly to the already strained recreation facilities in the Colstrip area.

- Cultural resources--the mine area appears to contain no archeological or historical sites of importance.

- Esthetics--existing sights and sounds of the mine would continue, but no lands of unusual scenic importance would be disturbed.

Short-Term Uses Versus Long-Term Productivity:

Coal from the Area B extension would be burned in the Midwest to generate electric power. Western Energy would pay a total of about $83 million in taxes and royalties. The taxes would help finance schools, both in Rosebud County and the State, and would also be used for other State, local, and Federal government expenses. These benefits would mostly be short term, although $660,000 of the total would be added to the State resource indemnity trust fund, and $20 million would accrue to the permanent trust fund established by the Montana Constitution.

If the mine area were not disturbed, it would continue to provide livestock forage, water (primarily for stock watering and downstream agricultural uses), wildlife habitat, scenery, and limited recreation opportunities. None of those uses is notable at present. The minesite has been heavily grazed, and following reclamation vegetative productivity may increase over the current level. Following reclamation there would be little change in the minesite's hydrologic function. Use by wildlife is limited at present and would not be greatly changed by mining. The minesite is of little importance for recreation and scenery.

Irreversible and Irretrievable Commitments of Resources

The Area B mine extension would remove about 32 million tons of coal through 1990. An additional 2 million tons of coal would not be recovered owing to the limitations of surface mining technology, and would probably be lost to future mining. The coal mined would be about 1/10 of 1 percent of the estimated strippable coal reserves in southeastern Montana.

At an average annual coal production rate of 3 million tons, about 2.5 million gallons of diesel fuel and 14 million kilowatt-hours of electricity would be used at the mine each year. Total direct energy used to mine and ship the coal to Midwest markets would amount to about 7 percent of the energy equivalent of the electricity generated from the coal. Indirect energy consumption (such as the energy needed to manufacture the heavy equipment used at the mine) is not known.

About 69 acre-feet/year of water would be consumed at the mine; about 10 acre-feet/year would be consumed by the projected increase in the population of Colstrip and Forsyth associated with the mine. This continued use would not conflict with existing water rights or uses.

The existing topography and stratigraphy would be permanently altered; however, the topography and stratigraphy is not unusual or intrinsically valuable. The primary effect of topographic changes would be a reduction in esthetic quality. Mixing of the stratigraphy and soil horizons would adversely affect hydrologic conditions and plant growth, but the effect would not be severe.

Based on past experience at strip mines in the region, about 25 worker-days would be lost from accidents through 1990.

A relatively minor amount of livestock forage would not be available during mining and initial reclamation.

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CHAPTER I

DESCRIPTION OF THE PROPOSAL UNDER CONSIDERATION

A. SCOPE OF THE ANALYSIS

Western Energy Company has applied for State and Federal permits to expand Area B of its Rosebud mine near Colstrip, Montana, into sections 4, 5, 9, 10, and 11, T. 1 N., R. 41 E. (See inside front cover and figure I-1.) The company proposes to bond 1,366 acres for mining level disturbance, 1,083 acres of which would be mined through 1990. The area to be mined is entirely within sections 4, 9, and 10 and is the focus of this EIS. The remaining 283 acres bonded for mining level disturbance but not mined would be used for haul roads, topsoil and spoil stockpiles, and a highwall reduction area.

Of the 1,366 acres included in the permit application, 711 acres have been previously permitted by the Montana Department of State Lands for use as haul roads and other disturbance associated with mining. The proposed permit amendment would allow Western Energy to mine part of the 711 acres. The remaining 655 acres are part of Western Energy's leasehold but are not now permitted for disturbance. Coal production from Area B is not expected to increase above the 3.7 million tons mined in 1977. (See table I-1).

The mining and reclamation plan (called hereafter the "mine plan") submitted by Western Energy must be approved by the Department of State Lands under the Montana Strip and Underground Mine Reclamation Act of 1973, as amended, before mining can begin. Western Energy has a permit for its current mining operations in section 3, T. 1 N., R. 41 E. If the company's mine plan proves acceptable, the Department would amend the company's existing permit. The Office of Surface Mining (OSM), U.S. Department of the Interior, must also approve the proposed mine plan under the Surface Mining Control and Reclamation Act of 1977, but Federal approval is not specifically considered in this EIS.

Because the proposed expansion may significantly affect the quality of the human environment, the pending State decision on the mining permit amendment requires an environmental impact statement (EIS). A draft environmental impact statement (DEIS) was issued in February, 1980. This final environmental impact statement (FEIS) includes public comments on the DEIS along with the Department's responses, and indicates changes in text in response to those comments.

The FEIS is divided into five main chapters and a summary. This chapter describes the company's proposal. Chapter II examines the existing environment that would be affected by the proposed mining. Chapter III assesses the impacts that would probably result from the company's proposal. Chapter IV outlines administrative and technical alternatives to the proposed mine plan that are available to the Department, and suggests other measures to mitigate environmental impacts. The summary briefly describes the company's proposal and its expected impacts.

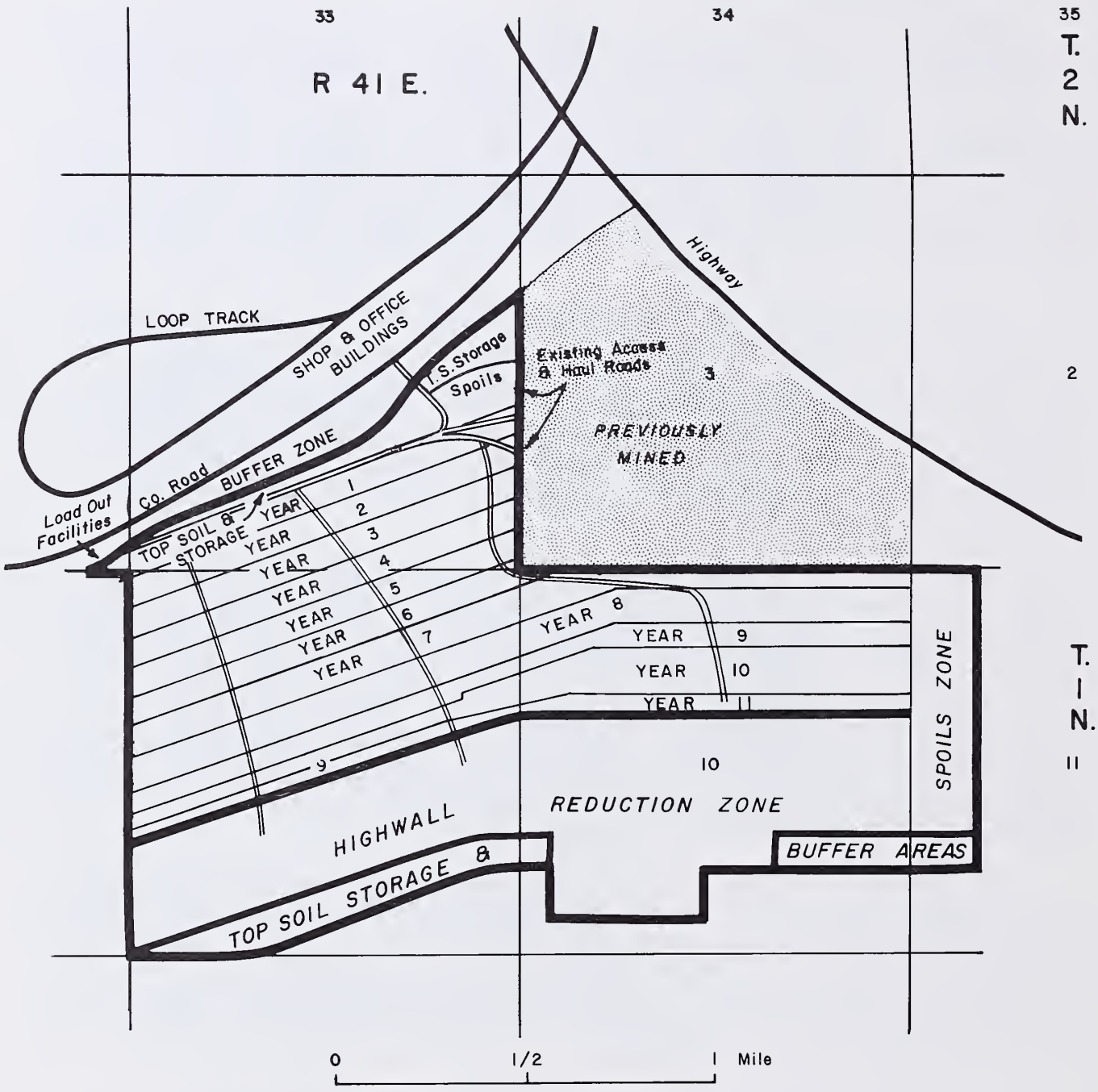

FIGURE I-1.--Sequence of mining at Area B.

TABLE I-1.--Annual production from Colstrip-area mines (millions of tons)

Year	Western Energy Co. Area B*	Western Energy Co. Total	Peabody Big Sky	Total
1975	0.0	6.4	2.2	8.6
1976	0.7	9.3	2.4	11.7
1977	3.7	9.8	2.3	12.1
1978	2.3	10.6	2.1	12.7
1979	1.6	11.4	2.3	13.7
1980	2.1	11.4	3.0	14.4
1981	3.5	12.3	4.2	16.5
1982	3.5	13.2	4.2	17.4
1983	3.5	14.3	4.2	18.5
1984	3.5	17.1	4.2	21.3
1985	3.1	19.1	4.2	23.3
1986	3.0	19.1	4.2	23.3
1987	3.4	19.1	4.2	23.3
1988	2.8	19.1	4.2	23.3
1989	2.9	19.1	4.2	23.3
1990	1.0	19.1	4.2	23.3

*Sections 3, 4, 9, and 10.

B. PREVIOUS EIS'S ON AREA B

In 1976 the Department of State Lands prepared an EIS on the expansion of Western Energy's Rosebud mine into Area B (sec. 3, T. 1 N., R. 41 E.). This document supplements the 1976 EIS and focuses on the extension of the Area B mine into sections 4, 9, and 10. The Rosebud mine was also discussed in FES 80-1, a regional analysis of coal development in the northern Powder River basin (U.S. Department of the Interior and Montana Department of State Lands, 1980). FES 80-1 provides an overview of cumulative impacts from mining and electric power generation in the Colstrip area, to which Area B of the Rosebud mine contributes. Pertinent portions of both previous EIS's are used as references in this document.

This EIS evaluates impacts from the Area B extension in the context of other ongoing and projected coal-related development in southeastern Montana. For example, impacts on social conditions due to Area B would be influenced by the influx of construction workers for Colstrip generating units 3 and 4. The analysis of social and fiscal conditions, air

quality, and transportation depends heavily on the context of coal development surrounding Area B. The analysis of impacts on hydrology, wildlife, and esthetics depends to a lesser extent on concurrent development; the analysis of impacts on geology, soils, and cultural resources is dependent to a minor extent. For additional cumulative analysis see FES 80-1.

Other developments considered in this EIS include:

- The remainder of the planned Rosebud mine (see table I-1).
- Montana Power Company's Colstrip generating units 1 and 2 (in operation), and generating units 3 and 4 (under construction). Total coal consumed by these units will be 8.1 million tons/year (mty) by 1986.
- Peabody Coal Company's Big Sky mine south of Colstrip, which is projected to produce 4.2 mty by 1985.
- Westmoreland Resources, Inc.'s Absaloka mine near Hardin, which is projected to produce 10 mty by 1985.

Mines near Decker in southern Big Horn County would not appreciably affect the Colstrip area and are not discussed in this EIS.

C. WESTERN ENERGY COMPANY'S PROPOSAL

1. Summary

The Area B mine is in southwestern Rosebud County, Montana, about 1 mile south of the town of Colstrip. Coal from Area B is hauled about 1 mile to the coal handling facilities at Area A north of East Fork Armells Creek. Coal from both Area A and Area B is loaded onto unit trains and shipped to meet Western Energy's long term contracts with utility customers in the upper Midwest (table I-2). The bulk of the coal is burned to generate electric power. Smaller amounts (about 300,000 tons/year) are directly used for space and process heat.

TABLE I-2.--Current and projected coal sales from Western Energy's Areas A and B (thousands of tons)

Utility/Generating Station	1978	1979	1980	1985
Northern States Power/Sherburne 1&2 (Minn.)	5,500	5,577	5,500	5,500
Wisconsin Power & Light/Columbia (Wisc.)	1,900	1,914	1,900	3,600
Upper Peninsula Generating/Marquette (Mich.)	171	300	300	-
Great Lakes Coal/various (St. Paul, Minn.)	600	300	300	300
Lake Superior Dist. Power/Bayfront (Wisc.)	90	120	200	270

Of the 1,366 surface acres under consideration in this permit amendment application, 1,116 acres are leased to Western Energy by Burlington Northern, Inc., and 250 acres are owned by Western Energy (see fig. I-2). Western Energy has requested bonding at mining level standards for the entire 1,366 acres so it can modify the location of haul roads without having to receive new permits. Western Energy obtained the Federal coal leases for section 4 in 1966 (lease #020989-038770) and for section 10 in 1979 (lease #M-35734). The company obtained the private coal leases in section 9 in 1959 from the Northern Pacific Railroad, now Burlington Northern, Inc. (see fig. I-3).

The proposed mine area contains 32.3 million tons of economically recoverable coal. Those reserves would be mined through 1990 at an average annual rate of 2.9 million tons/year. Past and projected coal production from Area B and the Rosebud mine is shown in table I-1.

Of the 6 coal seams in the area, Western Energy plans to mine only the uppermost seam, the Rosebud. The Rosebud averages 18-26 feet in thickness, is subbituminous (averages 8,595 BTU's/pound as received) and contains about 0.71 percent sulfur by weight. The Rosebud seam is covered by an average of about 120 feet of overburden. The overburden is shallowest (under 50 feet thick in places) near East Fork Armells Creek where Western Energy would begin mining, and is over 200 feet thick in areas of higher relief in sections 9 and 10.

The McKay seam is 10-100 feet below the Rosebud. Western Energy has not found a suitable market for the McKay seam because of the coal's tendency to slag at normal boiler operating temperatures. The company therefore does not plan to mine the seam.

2. Facilities

Western Energy does not propose to build new facilities for the Area B extension. Existing facilities (fig. I-4) include:

- A 0.8-mile access road to highway FAP 39.
- A 3.8-mile railroad spur and loop track in Area A.
- Several steel-framed structures, an office, a maintenance shop, change rooms and bath facilities, storage buildings, and a heavy-equipment wash facility.
- Fuel and explosive storage tanks.
- Coal-handling facilities at Area A: primary and secondary crushers, coal storage pile, tipple loadout with weighing and sampling stations, and a unit train loadout.
- Water supply (from Colstrip), a three-cell lagoon for domestic waste, and impoundments to collect water for dust suppression.

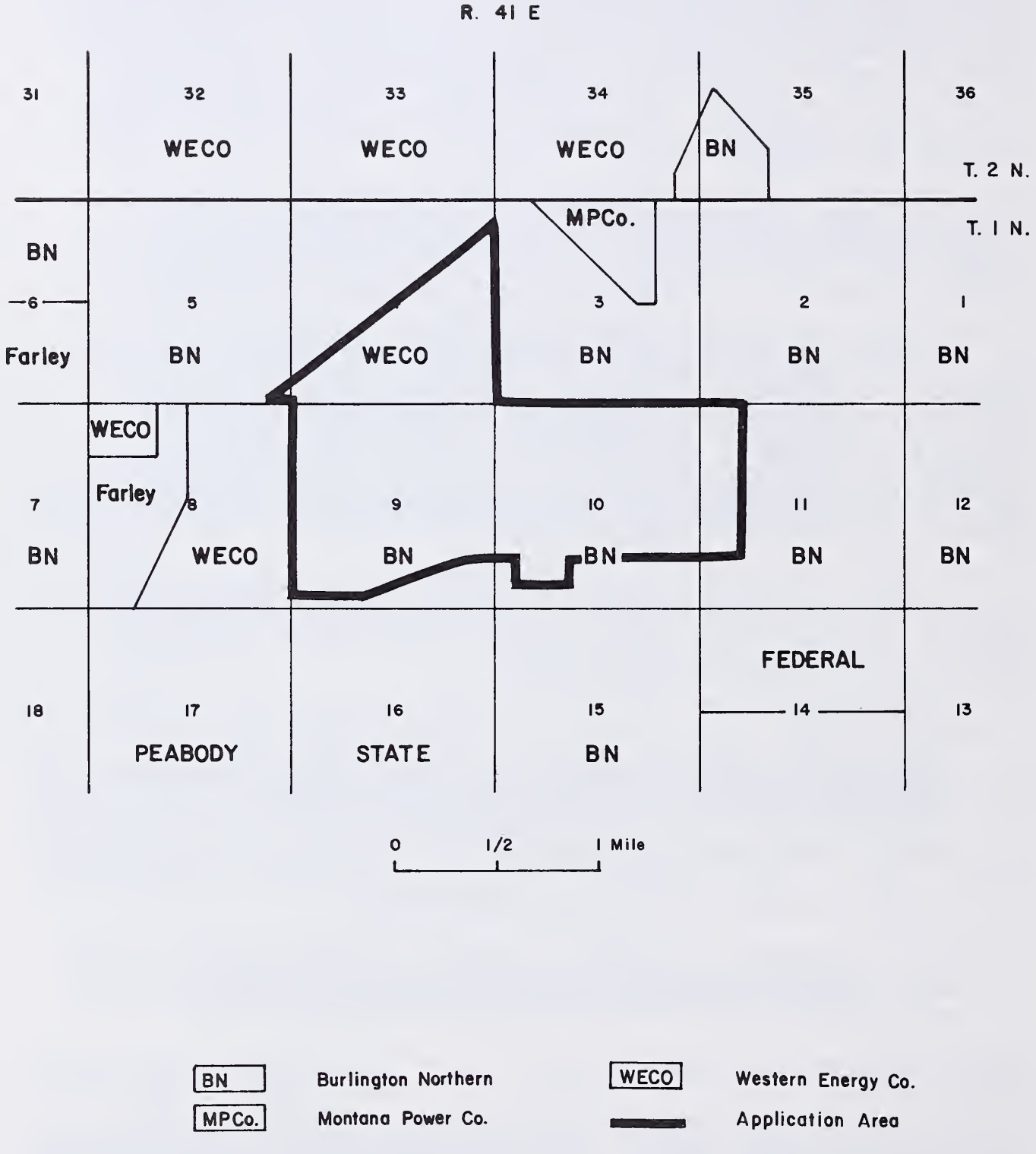

FIGURE I-2.--Surface ownership at Area B.

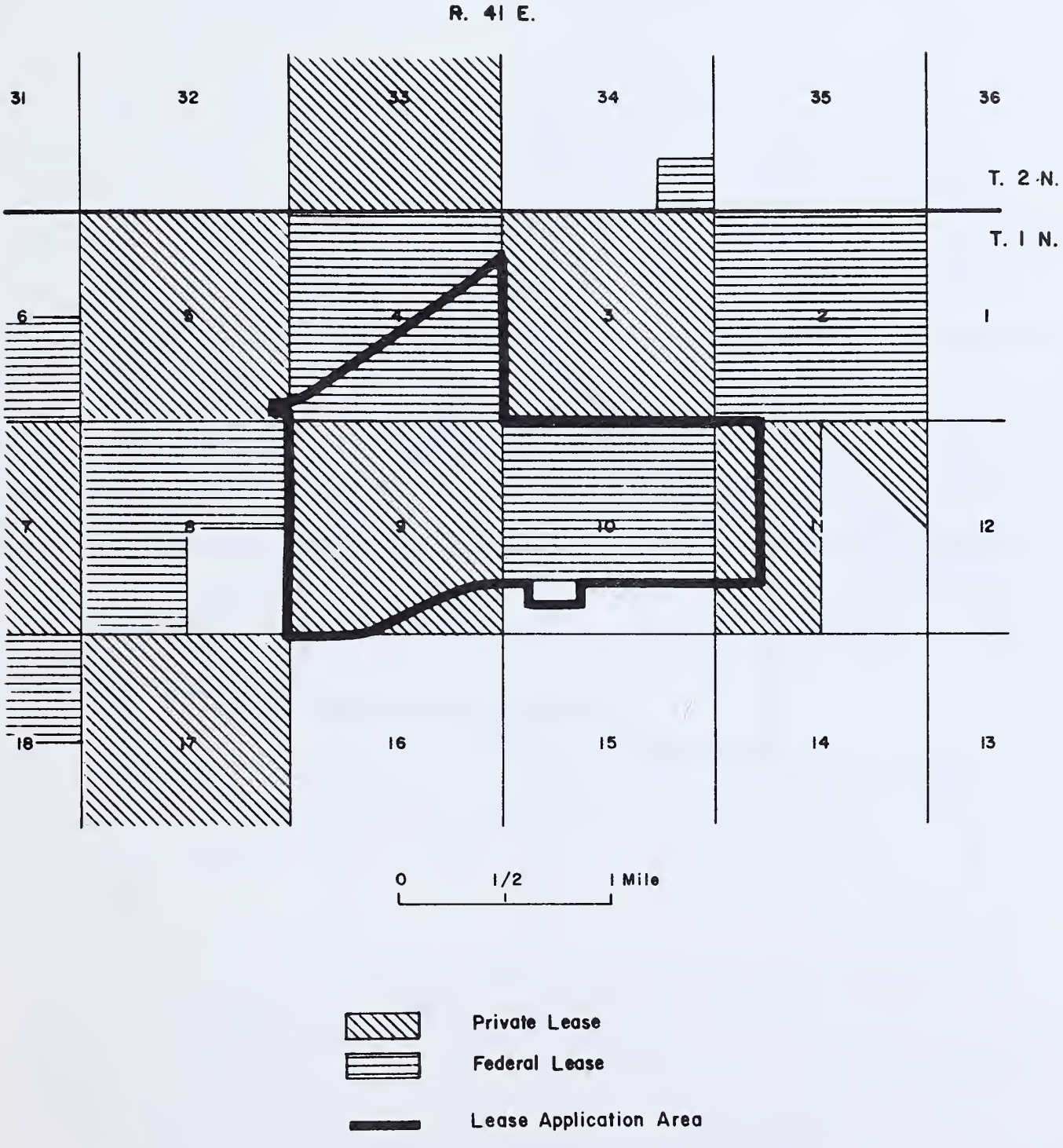

FIGURE I-3.--Coal leases held by Western Energy Co. at Area B.

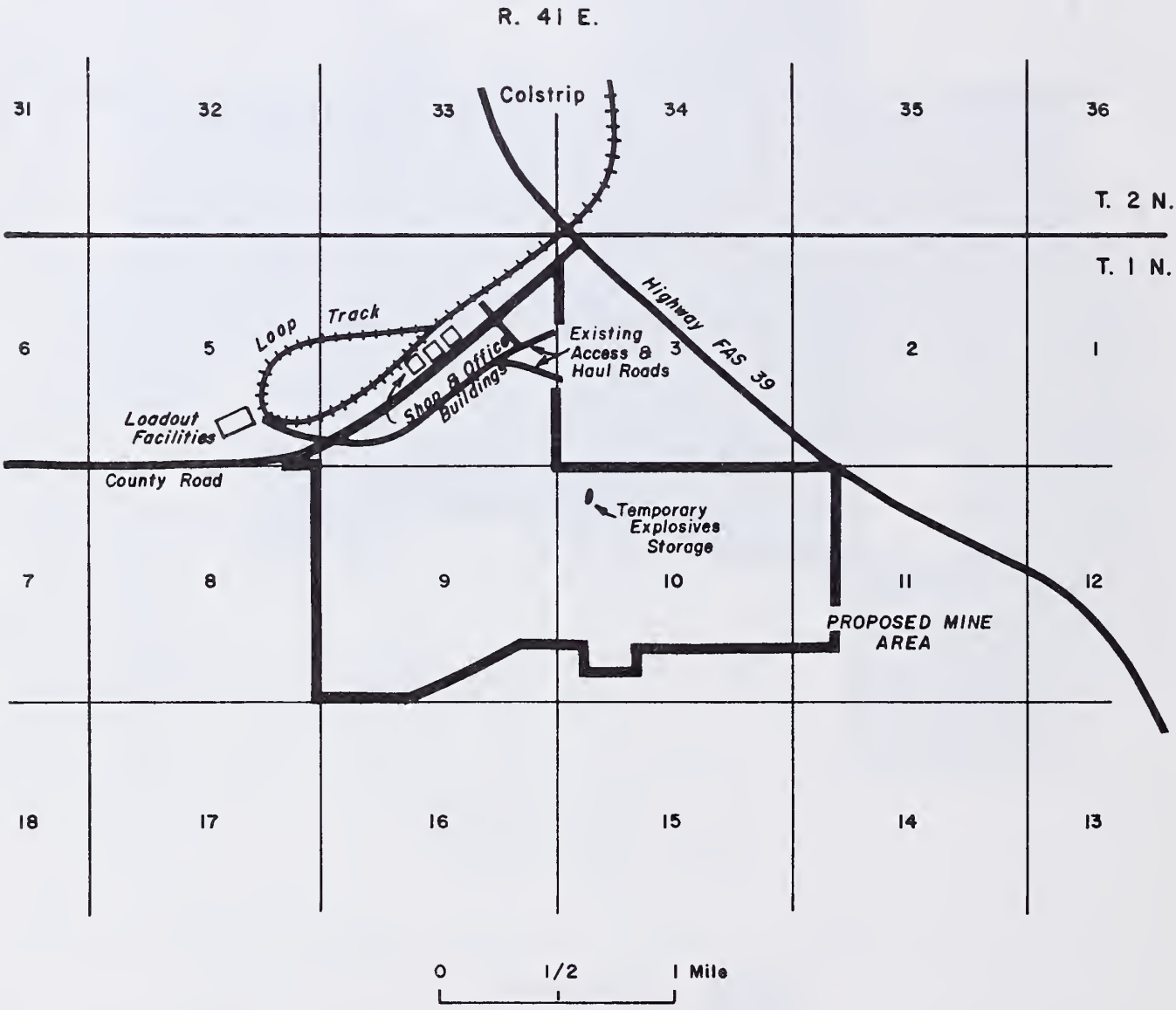

FIGURE I-4.--Location of facilities at Area B. Coal loadout and railroad loop is shared with Area A.

- Existing haul roads with new extensions into the pit.
- 115 kV and 12.5 kV powerlines from Colstrip.
- Portable substations to provide power to equipment in the pit.

3. Mining Sequence

Mining would progress from an existing haul road in section 4, T. 1 N., R. 41 E., southeasterly into sections 9 and 10. (See fig. I-1.) The dragline trenches would be oriented nearly parallel to Armells Creek in sections 4 and 9, swinging due east in section 10. Western Energy plans to apply in the future for the necessary mining permits to extend Area B beyond the present extension; sections 7, 8, 17, and 18, T. 1 N., R. 41 E. would be tied into the cuts proposed in sections 4, 9, and 10. Impacts of the additional extension are discussed in general terms in chapter IV, High Production Level.

4. Mining Methods

Topsoil and subsoil to be used for reclamation would be selectively salvaged using scrapers and dozers prior to removing overburden. The salvaged soils would be directly redistributed to regraded spoils where feasible. Some soils must be stockpiled for later use because soils cannot be replaced on active mine pits.

The overburden would be drilled and ammonium nitrate-fuel oil (ANFO) explosives used to loosen the overburden. After the overburden has been fractured, a Marion 8050 dragline with a 60-cubic-yard bucket would strip the overburden from the coal and deposit it in a pit where the coal has already been extracted.

The exposed Rosebud coal seam would be cleaned, drilled, blasted, and loaded by electric shovels into rubber-tired, bottom-dump haulers for transport to the existing crusher loadout tipple in Area A. The crushed coal would then be loaded into unit trains for transport to Midwest markets.

5. Reclamation Plan

To comply with the Montana Strip and Underground Mine Reclamation Act, Western Energy must reclaim and restore all disturbed lands. Western Energy's proposed reclamation program includes the following measures: topsoil and subsoil salvaging; backfilling; regrading; highwall reduction; drainage reconstruction; topsoil and subsoil redistribution; revegetation; and monitoring. Western Energy plans to plant native grass mixtures, and interseed and transplant forbs, shrubs, and trees, at a frequency similar to that which existed before mining. (See chapters II and III, Hydrology, Soils, and Vegetation.)

After being reclaimed, Area B would be used for domestic livestock grazing. Western Energy proposes to reestablish wildlife habitat within

the mine area to conditions similar to or better than those existing before mining.

After the draft EIS was issued, Western Energy made a number of modifications in their reclamation plan in response to the Department's review. As a result, the impacts expected from the revised plan would be substantially less than as originally proposed. Specific changes in the reclamation plan are identified and evaluated in chapter III.

CHAPTER II

DESCRIPTION OF THE EXISTING ENVIRONMENT

This chapter describes the environment that would be affected by the proposed extension of Area B of Western Energy's Rosebud mine. Additional information on the existing environment is found in the previous environmental impact statement (EIS) on Area B (Montana Department of State Lands, 1976). Information on region-wide conditions is contained in the regional analysis volumes of FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980). The information in those EIS's has been updated in this chapter to provide a context for the discussion of environmental impacts in chapter III.

A. GEOLOGY

1. Topography and Geomorphology

The topography and geomorphology of Area B is typical of southeastern Montana. Bedrock underlying this region consists of relatively flat sediments of the Fort Union Formation. Water, wind, and other forms of erosion have modified the land surface to a series of prominent bedrock ridges and breaks separated by valleys. The bedrock ridges and breaks are composed of relatively erosion-resistant sandstone and clinker (porcellanite).

East Fork Armells Creek, the major drainage dissecting Western Energy's Rosebud mine, trends eastward until it reaches the community of Colstrip. From there it turns sharply to the north and eventually enters the Yellowstone River.

Area B lies south of East Fork Armells Creek and is drained by five short, northward-flowing ephemeral drainages which originate in clinker-capped sandstone bluffs and uplands 1 mile to the south. The bluffs drop abruptly to gently rolling, sandy, slopes. Topographic relief is about 340 feet, ranging from about 3,260 feet near East Fork Armells Creek to about 3,600 feet on the bluffs.

The area is not densely vegetated and erosion rates are high. Sheetwash and rainsplash are the dominant erosion processes, although some gullying has been observed. Headward sapping due to subsurface seepage and piping may cause the gullying. Slope runoff and high channel flows occur during spring snowmelt and during intense rainstorms.

2. Overburden

Overburden texture in Area B varies greatly, ranging from loamy sand to clay. The chemical and lithologic properties of the overburden are also quite variable (table II-1). Molybdenum, cadmium, zinc, salt, and clay in some parts of Area B exceed State suspect levels. Suspect levels indicate that reclamation and postmining land use may be affected if spoils with these properties are moved near the surface. (See chapter III, Geology.)

TABLE II-1.--Overburden properties significantly exceeding State suspect levels

Core hole	Location	Property	Depth of affected core	Length of affected core	Percent of total core	Observed value	State suspect level
	Section 4, T.1 N., R.41 E.						
N47-E54	NE 1/4 SE 1/4	Molybdenum	-	-	-	$\bar{X}$= 1.2 ppm	0.3 ppm
N45-E52	SW 1/4 SE 1/4	Cadmium	80'-102'	22'	-	$\bar{X}$= 1.9 ppm	0.1-1.0 ppm
N45-E54	SE 1/4 SE 1/4	Zinc	60'-65'	5'	-	332 ppm	40 ppm
			80'-85'	5'	-	280 ppm	40 ppm
			100'-105'	5'	-	208 ppm	40 ppm
	Section 9, T.1 N., R.41 E.						
N44-E50	NW 1/4 NW 1/4	Salinity	0'-25'	25'	-	5.9-9.9 mmhos/cm	4-6 mmhos/cm
N44-E51	NE 1/4 NW 1/4	Salinity	0'-20'	20'	-	4.8-8.1 mmhos/cm	4-6 mmhos/cm
N44-E54	NE 1/4 NE 1/4	Zinc	-	55'	28%	>40 ppm	40 ppm
		Clay	-	80'	38%	>40% clay	40% clay
N43-E51	SE 1/4 NW 1/4	Salinity	0'-30'	30'	-	4.9-7.5 mmhos/cm	4-6 mmhos/cm
	Section 10, T.1 N., R.41 E.						
N44-E56	NE 1/4 NW 1/4	Salinity	0'-25'	25'	-	5.2-8.0 mmhos/cm	4-6 mmhos/cm
		Clay	-	30'	34%	>40% clay	40% clay
		Molybdenum	-	-	-	$\bar{X}$=1.6 ppm	0.3 ppm
N44-E58	NW 1/4 NE 1/4	Salinity	5'-20'	15'	-	4.4-10.2 mmhos/cm	4-6 mmhos/cm
		Clay	60'-87'	27'	-	$\bar{X}$=44% clay	40% clay
N43-E55	SW 1/4 NW 1/4	Clay	-	40'	23%	>40% clay	40% clay
		Molybdenum	-	-	-	$\bar{X}$=1.1 ppm	0.3 ppm
		Phosphorus	-	-	-	very high	no limit
N43-E56	SE 1/4 NW 1/4	Salinity	0'-25'	25'	-	4.4-8.6 mmhos/cm	4-6 mmhos/cm
		Clay	-	35'	27%	>40% clay	40% clay
		Molybdenum	-	-	-	$\bar{X}$=1.1 ppm	0.3 ppm
		Phosphorus	-	-	-	very high	no limit
N43-E58	SW 1/4 NE 1/4	Clay	-	35'	26%	>40% clay	40% clay
		Molybdenum	-	-	-	$\bar{X}$=2.4 ppm	0.3 ppm
N43-E59	SE 1/4 NE 1/4	Clay	-	35'	35%	>40% clay	40% clay
		Molybdenum	-	-	-	$\bar{X}$=0.8 ppm	0.3 ppm
		Zinc	-	-	-	samples at 70, 71 & 130 ppm	40 ppm

B. HYDROLOGY

1. Surface Water

Area B is within the East Fork Armells Creek watershed. Near Area B and the town of Colstrip, East Fork Armells Creek is an intermittent stream, flowing only during part of the year. The East Fork has a drainage area of about 36 square miles above Colstrip (Hydrometrics, unpublished paper, 1980). The proposed expansion covers 1,366 acres, or about 5 percent, of this drainage area.

The proposed mine area is drained by portions of five northward-flowing ephemeral streams (fig. II-1). Currently, mining in section 3 of Area B disturbs three of these ephemeral drainages.

Surface flow is diverted around the active mine areas and directed to sedimentation ponds. Total inflow to all sedimentation ponds is lost to infiltration and evaporation; currently no streams that pass through the mine discharge directly to East Fork Armells Creek. Western Energy has received discharge permits for existing and proposed sedimentation ponds from the Montana Department of Health and Environmental Sciences. The company would discharge water from all ponds to maintain the required water storage volume to contain runoff for a 10 year-24 hour event. Discharges would be within 15 days of any runoff event or pumping from mine pits.

One small spring is near the mine area in NE 1/4 NE 1/4, section 8, about 600 feet southeast of East Fork Armells Creek (fig. II-1). The flow may be as high as 10 gpm. The apparent source of the spring is several feet of clinker gravel underlying alluvium and colluvium within the tributary small coulee.

Surface water in the proposed mine area is used for stock watering. Currently, enough water exists to meet demands. A stock reservoir in the NW 1/4 of section 10 (fig. II-1) has perennial storage (Van Voast and others, 1977, table 11). However, it was dry in late August, 1979. No lands are irrigated with surface flow from East Fork Armells Creek within 2 miles of the mine area (Westech, 1979). The company plans to reestablish surface water as a watering source for livestock after mining.

The Department of State Lands has determined that East Fork Armells Creek meets the geomorphic and hydrologic criteria for designation as an alluvial valley floor (AVF): the terraces of the creek are underlain by alluvial deposits; the lower terrace is subirrigated, the upper terraces may be subirrigated. The company must submit information on vegetative productivity and hydrology before the Department can determine whether the terraces meet the significance criterion for AVF designation. Pending final determination, the Department will require the company to avoid practices that could adversely affect the hydrologic function and agricultural use of East Fork Armells Creek and adjacent land.

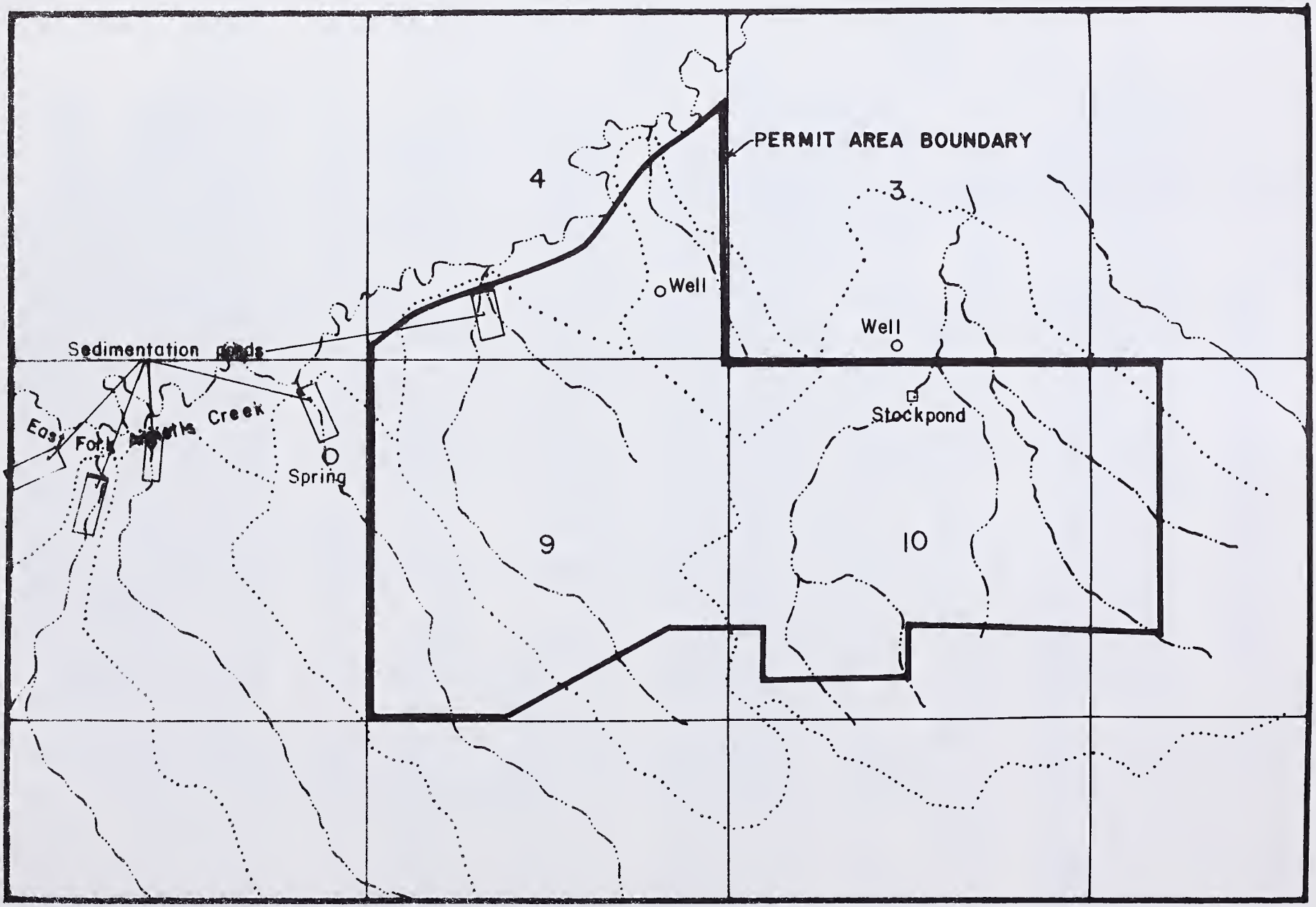

FIGURE II-1.--Drainage features in Area B. Dash-and-dot lines show ephemeral streams; dotted lines show drainage divides.

Water quality in the mine area and in the East Fork is suitable for use by livestock (Van Voast and others, 1977, 1978; Dollhopf and others, 1978; Botz, 1978). Surface water is typically of the calcium-magnesium sulfate type and varies greatly in degree of mineralization. Total dissolved solids (TDS) in all spring and well waters range from 420 to 5,860 mg/L (Van Voast and others, 1977). Surface water quality in East Fork Armells Creek decreases as it passes through the Rosebud mine and Colstrip area, as shown by measurements on July 24-25, 1973 (Van Voast and others, 1977).

	Distance from Colstrip				
	7 miles upstream	1 mile upstream	North end of Colstrip	1 mile downstream	4 miles downstream
TDS (mg/L)	2,740	2,400	2,530	3,480	3,900

Possible causes of this decrease in water quality are: 1) seepage and discharges from the community of Colstrip, such as from lawn watering and from the community sewage treatment plant; 2) seepage from mine areas, such as mine spoils and sedimentation ponds; and 3) natural causes such as evaporation and additions of surface or ground water of poorer quality. The contribution of Area B to the decrease in water quality cannot be determined from existing data.

Operation of Colstrip generating units 1 and 2 (which began after the above measurements were taken) have probably added to the problem of lower water quality downstream of Colstrip. Very poor quality water used in stack gas scrubbers is seeping from industrial ponds into underlying aquifers which eventually discharge into East Fork Armells Creek or creeks to the east of the mine (Botz, 1978). Colstrip generating units 3 and 4 will require more industrial ponds which will seep additional poor quality water (Sherry Schwend, Western Energy, written commun., September 9, 1980). The industrial ponds have the potential for creating worse water quality problems than the mines because the seepage from the industrial ponds would be of lower quality.

Area B is probably adding some salts to nearby surface and shallow ground waters. Water stored in sedimentation ponds becomes more saline through contact with mine spoils and from evaporation. A good portion of this water probably seeps into East Fork Armells Creek, where it may slightly decrease water quality in the creek. Some seepage from these ponds also moves east where it may eventually surface in the Cow Creek drainage.

An existing impoundment at Area B effectively captures about 5 percent of the drainage area of East Fork Armells Creek above Colstrip. This may affect the size and timing of surface water flows in East Fork Armells Creek as long as the impoundment is in place. The peak flood flow of East Fork Armells Creek could be expected to be about 5 percent less than normally would be the case at Colstrip. This probably reduces

the area that can be flood irrigated downstream, but how much is not known. The reduction in irrigable area would be most noticeable in a dry year. The entire Rosebud mine impounds about 20 percent of the runoff from the drainage area of East Fork Armells Creek above Colstrip, so Area B now contributes about one-fourth of this impact.

Concentrations of cadmium, lead, iron, manganese, sulfates, and total dissolved solids in East Fork Armells Creek occasionally exceed U.S. Public Health Service standards (Van Voast and others, 1977). These waters, however, are typical of those in the Colstrip area.

2. Ground Water

Ground water in the proposed mine area is used for stock watering and dust control in the mine pit and on haul roads. Two stock wells in section 4 are in the proposed mine area (fig. II-1). Ground water also contributes to the flow of East Fork Armells Creek and is the source of a spring in section 8 (fig. II-1).

The three important near-surface aquifers in the Colstrip area are, in descending order, East Fork Armells Creek alluvium, the Rosebud coal seam, and the McKay coal seam. Western Energy does not propose to mine the McKay seam. Other important ground-water-bearing units also underlie the Colstrip area, but they would be not be disturbed by mining at the Rosebud mine and are not discussed in this EIS.

The alluvium of East Fork Armells Creek is locally as thick as 40 feet, with the lower 20 feet of sand and gravel generally overlain by a similar thickness of clay and silt. The alluvium passes about 60 gpm according to Van Voast (1977)--much more ground water than either of the two coal seam aquifers. However, the area of alluvium is limited, whereas the two coal seams underlie much of the Colstrip area.

Ground water in the alluvium of East Fork Armells Creek generally flows parallel to intermittent channel flow. West (upstream) of the proposed mining in Area B, the alluvium is recharged from above by streamflow and precipitation, and laterally from subcropping bedrock aquifers. Downstream from Colstrip, the East Fork receives recharge from the alluvium (Van Voast and others, 1977).

The Rosebud and McKay coal seams are typically about 25 and 10 feet thick, respectively. The interburden between the coal seams varies in thickness throughout the area, is composed of clay, silt, and sand beds, and commonly acts as at least a partial hydraulic barrier to vertical ground water movement (Van Voast and others, 1977; Dollhopf and others, 1979). Accordingly, the Rosebud and McKay coal seams each possess a fairly distinct hydrologic system separated by the interburden. The McKay coal seam would not be mined, so it is not discussed further.

Ground water within the Rosebud coal seam generally flows eastward across Area B. Flow direction is controlled generally by structural

gradient, variable transmissivities, and outcrop geometry. Recharge occurs primarily in higher country west of the mine area. Discharge occurs to East Fork Armells Creek alluvium near Area B and to tributaries of Rosebud Creek east of the Area B. The coal seam discharges laterally to alluvium and colluvium at its outcrop, occasionally resulting in increased vegetative growth (Van Voast and others, 1977; Dollhopf and others, 1979).

The natural ground water quality in the Colstrip area varies widely and does not seem to be strongly correlated with any aquifer or stratigraphic position. No particular cation is dominant; however, sulfate is commonly the most typical anion, regardless of the aquifer (Van Voast and others, 1977). Nickel concentrations in ground water are generally higher in mined areas than in undisturbed areas around Colstrip (Van Voast and others, 1977). Lead concentrations in ground water may also be higher in mined areas, but lead in concentrations exceeding U.S. Public Health Service standards (.05 mg/L) are found in ground water in undisturbed aquifers in the Colstrip area, and the technique used to measure lead concentrations in water samples is suspect (Van Voast and others, 1977).

An increasingly high water table in the alluvium of East Fork Armells Creek has reportedly greatly reduced hay crops over the past 6 years in meadows adjacent to East Fork downstream from Colstrip (Van Voast and others, 1977, p. 4; J. R. Lee, oral commun., November 6, 1980). The slow seepage of impounded surface water into East Fork Armells Creek (see Surface Water) could increase the amount of non-peak flood flows and contribute to the high ground water table and resulting waterlogging of hay fields north of Colstrip. Other--and perhaps the primary--causes of the waterlogging are an increase in precipitation in the early-mid 1970's, normal municipal runoff, the point discharge to East Fork Armells Creek permitted for the Colstrip municipal wastewater treatment facility, industrial ponds which receive waste water from Colstrip units 1 and 2, and the surge pond which feeds the generating units (see Surface Water). Several dike and spreader irrigation systems along East Fork Armells Creek may have contributed to the problem.

The ground water hydrology of the Colstrip area is further described in previous environmental impact statements prepared by the Montana Department of State Lands (1976; 1977) and by other investigators (Van Voast and others, 1977; Dollhopf and others, 1978; Botz, 1978; and Hydrometrics, 1980). All of those studies have investigated the relationship of surface coal mining to the local hydrology.

C. CLIMATE

The semiarid climate at Colstrip is typical of the continental steppes of the northern Great Plains. Precipitation is low but variable and falls primarily during the warmer months. Daily temperature variations are large, and seasonal temperature variations are pronounced. Surface humidity is low, and the prevailing wind speeds moderate.

Mean annual precipitation is 15.8 inches; about 50 percent occurs from April through June, 20 percent in the winter, and the remainder in the fall. Precipitation falls during 95 days in an average year. Recurrence intervals for 6- and 24-hour precipitation events are presented in table II-2.

Mean annual temperature is about 45°F. Temperatures are lowest in January, averaging about 8°F, and highest in July, averaging about 90° F. High midsummer temperatures and low precipitation terminate the effective growing season. Relative humidity is lowest in July and highest in winter. The freeze-free season is about 115 days.

Winds from the northwest dominate at Colstrip. Wind from a single 22.5-degree sector persisted for 12 or more hours on only 22 occasions during 1 year of measurement, 50 percent of these occurring during the winter (Super and others, 1973). Average winter wind speed ranges from 14 miles/hour (mph) at a height of 300 feet to 7 mph at ground level. Wind speeds greater than 17 mph occur less than 7 percent of the time. Vertical air movement at Colstrip is characterized by a high frequency of ground-based thermal inversions (Super and others, 1973) and an annual mean maximum mixing depth of 3,414 feet above ground level (Heimbach and Super, 1973).

The regional volume of FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980) contains a detailed analysis of the climate at Colstrip. Climatic conditions have important effects on reclamation and revegetation success and on air quality impacts.

TABLE II-2.--Size of largest storm expected at Colstrip, Montana, during various lengths of time

Length of event	Size of largest storm (inches)						
	Number of years considered						
	2	5	10	25	50	100	200
6 hours[1]	1.00	1.30	1.60	2.00	2.20	2.40	-
24 hours[2]	1.25	1.74	2.04	2.38	2.62	2.83	3.03

[1]Values taken from Miller and others, 1973.

[2]Values calculated from precipitation records at Colstrip, 1948-1976.

D. AIR QUALITY

Air quality in the Colstrip area has deteriorated substantially in the past 6 years. Prior to 1974, the Federal primary ambient air quality standard for annual concentrations of total suspended particulate (TSP) was not exceeded. Since that time, this standard has been violated every year but 1978 (fig. II-3). In 1977 the annual geometric mean for TSP in Colstrip was 92 ug/m^3; the next highest concentration in eastern Montana, 48.1 ug/m^3, was recorded at Ekalaka (Gelhaus and others, 1978). The 24-hour maximum allowable concentrations of TSP and the Montana State guidelines for dustfall (table II-3) have also been consistently exceeded since 1974. Due to these violations, a 120-square-mile area surrounding Colstrip was designated a "nonattainment area" in 1978 (Federal Register 43 CFR 8962). The Federal Clean Air Act defines a "nonattainment area" as one which is shown by monitoring data or which is calculated by air quality modeling to exceed any national ambient air quality standard (Sec. 171(2)). In December, 1979, Western Energy filed a petition against the nonattainment designation with the Montana Department of Health and Environmental Sciences and the U.S. Environmental Protection Agency. Monitoring data from throughout this area (open file report, Montana Air Quality Bureau) indicate that the TSP problem exists only in the immediate vicinity of Colstrip.

Western Energy has implemented a number of dust control measures since early 1978 (table II-4; see chapter III, Air Quality). These measures were estimated to reduce total particulate emissions in Colstrip by 150 tons/year; they were not sufficient to prevent the violation of the maximum allowable 24-hour concentration of TSP during the first 4 months of 1979. Table II-5 lists further dust control measures implemented by Western Energy in late 1979 or planned for 1980. Those measures would improve the air quality at Colstrip. However, with the construction of Colstrip units 3 and 4, and the concomitant increase in mining necessary to fuel them, it is not possible to determine whether the Colstrip area will comply with the Federal Ambient Air Quality Standards in the future.

TABLE II-3.--Montana ambient air quality guidelines

Pollutant	Guideline	Averaging Time
Suspended Particulate------	75 ug/m^3	Annual
	200 ug/m^3	24 hour*
Sulfur Dioxide----------	0.02 ppm	Annual
	0.10 ppm	24 hour**
	0.25 ppm	1 hour***
Settled Particulate--------	15 T/mi^2 (residential area)	3 month
	30 T/mi^2 (industrial area)	3 month

*Not to be exceeded more than 1 percent of the days in a year.
**Not to be exceeded more than 1 percent of the days in 3 months.
***Not to be exceeded for more than 1 hour in any 4 consecutive days.

TABLE II-4.--Control measures taken since early 1978

Item	Estimated Reduction (tons/year)
Burtco landscaping and street paving--17.5 acres	43.3
Lawn seeding, new homes--13.6 acres	32.9
Lawn seeding between schools--2.5 acres	6.0
Lawn seeding in plant area--0.6 acres	1.5
Paving of airstrip--8 acres	24.3
Seal coating of Pine Street--0.4 acres	1.5
Cherry Street paving--2.1 acres	7.6
Paving roads and lots in plant area--0.8 acres	2.5
Scoria placement on disturbed plant areas--5.8 acres	8.8
Experimental treatment of haul roads with calcium chloride--3 miles	22.5
Total	150.9

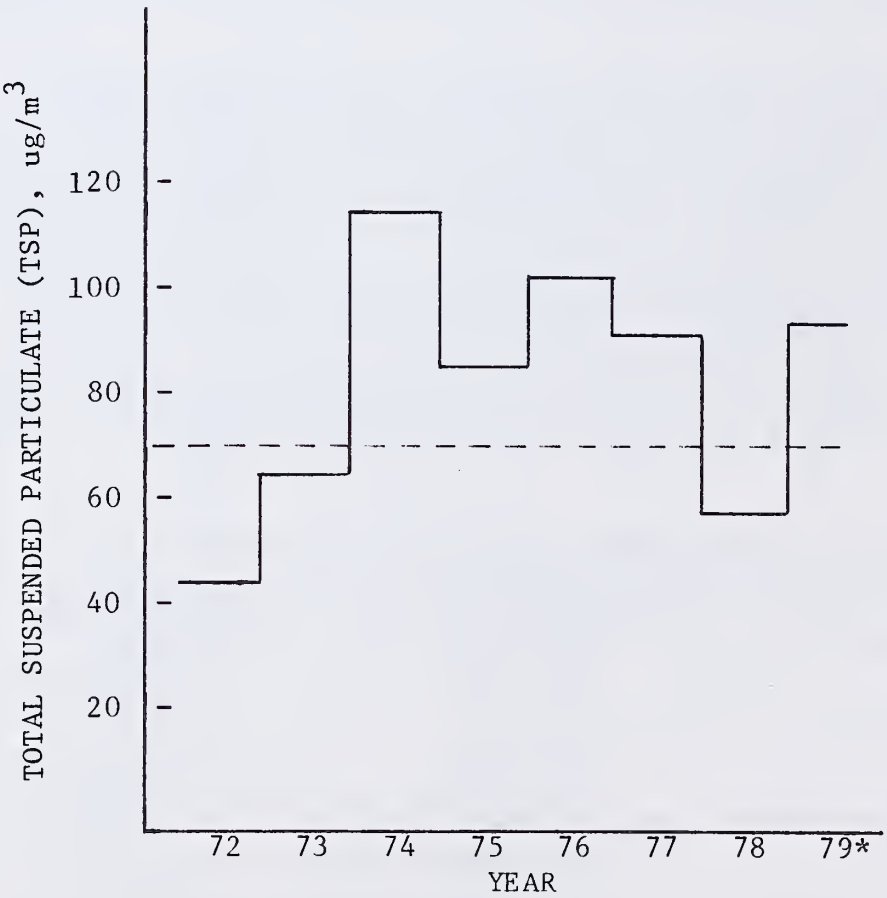

FIGURE II-3.--Annual geometric mean TSP concentrations in Colstrip, 1972-1979. Dashed line shows the Federal primary ambient air quality standard of 75 ug/m^3. *1979 data are for January through April.

TABLE II-5.--Control measures to be implemented in Colstrip as of September, 1979

Item	Tentative Date
Areas removed from wind erosion	
Lawn seeding of new homes--13.6 acres	Spring-Fall 1980
Lawn seeding at two ball fields--3.7 acres	Spring 1980
Reclamation of borrow area, southwest portion of Colstrip--4.2 acres	Fall 1979
Colstrip units 1 & 2 warehouse and associated paving--2.35 acres	1980
MPC resource shop and associated paving--2.59 acres	1980
Paving parking lot in plant area--0.7 acres	Fall 1979
Road paving in plant area--0.5 acres	Fall 1979
Pave alley behind MPC 3--0.15 acres	Fall 1979
Total acreage = 27.2 Effective reduction = 83.3 tons/yr.	
Other control measures	
Water spraying active coal pile for units 1 and 2	Fall 1979
Apply crusting agent to dead storage pile--5 acres	Winter 1979
Apply calcium chloride to 12.7 miles of haul road	Spring 1980
Mulch and/or seed within 90 days of topsoil redistribution on reclaimed lands	Fall 1979

E. SOILS

Soils in the mine area are poorly to moderately well developed and have average potential productivity--about 1,600 to 1,800 pounds/acre.

Capability groupings (Soil Conservation Service, delineated in Western Energy's Area B permit application) indicate that about 792 acres are suitable for cultivation with severe (Group III) or very severe (Group IV) limitations. About 246 acres are suitable for use as rangeland (Group VI and VIII). About 46 acres of soils and rock outcrops are unsuitable for cultivation or rangeland. None of the soils meets the criteria for prime farmland. The high potential for erosion is a major factor limiting land use, although dissected topography, frequently sandy texture, and periodic drought restrict use as well.

Important parameters of the most well-developed soil order, the Aridisols, include well-developed structure and profile development, (which contribute to good hydraulic conductivity, water holding capacity, and root penetration) and translocation and concentration of salts to mid- and lower portions of the soil profile. Salts limit the volume of soil which can be salvaged for reclamation. These soils occupy 784.8 acres, or 72 percent of the area proposed for disturbance. Aridisols would contribute 1974.1 acre feet (72 percent) of potentially salvageable topsoil material.

Mollisols with a moderately well-developed profile and a dark, enriched surface (A) horizon (layer) have been mapped on 7.5 acres (less than 1 percent), and constitute less than 2 percent (51.1 acre feet) of the salvageable soils resource.

Entisols, which are minimally developed, occupy 223.3 acres (21 percent) of the area, and would provide 695.6 acre feet (25 percent) of the salvageable soils. Salvage depth is usually limited by bedrock. (See table II-7.)

The remaining area, 68 acres (6 percent), is occupied by rock outcrops and minor soil inclusions. These soils could be salvaged to yield about 21.6 acre feet of soil material, or less than 0.1 percent of the total.

F. VEGETATION

Vegetation in the mine area is dominated by three major classes: rangeland, land disturbed in the past, and agricultural land (Sindelar, 1972; Ecological Consulting Service, 1975, 1976). Rangeland, consisting of grassland and shrub/grassland communities, is the most extensive class on the proposed mine area--about 1,210 acres. Agricultural lands, consisting of dryland winter wheat fields, is the second most extensive class on the mine area--about 110 acres. These fields currently produce between 30-35 bushels per acre--about average for southeastern Montana.

TABLE II-7.--Comparison of profile description for principal soils (>50 acre feet) in sections 4, 9, and 10 of Area B

Series & Profile number	Potential salvage depth	Limiting factor	Surface texture (<6")* %Clay/%Sand	Subsurface texture (>6")* %Clay/% Sand	Potential volume (acre feet)
Busby (2)	38"	Bedrock	11/82 (LS)	10/81 (LS)	684.0
Busby (8)	26"	Bedrock	8/82 (LS)	13/79 (SL)	
Cabbart (4)	22"	Bedrock	23/65 (SCL)	30/42 (CL)	152.8
Cabbart (7)	26"	Bedrock	12/54 (SL)	10/77 (SL)	
Kobar (18)	51"	Salts	32/29 (CL)	38/25 (CL)	164.3
Kobar (19)	52"	Salts	28/28 (CL)	32/29 (CL)	
Lonna (20)	32"	Salts	21/33 (L)	37/20 (CL/SiCL)	282.6
Lonna (21)	70"	Salts	32/31 (CL)	32/34 (CL)	
Unnamed (1)	17"	Salts	17/65 (SL)	24/62 (SCL)	592.8
Unnamed (6)	19"	Salts	30/31 (CL)	39/25 (CL)	
Unnamed (15)	28"	Salts	30/20 (CL/SiCL)	36/15 (SiCL)	
Ustic Torri-orthents (16)	>92"	Not reached	21/31 (L)	25/36 (L)	482.5
Ustic Torri-orthents (17)	45"	Salts	18/30 (SiL)	16/36 (SiL)	
Yamac (3)	36"	Bedrock	17/70 (SL)	21/61 (SCL)	247.6
Yamac (5)	60"	Bedrock	20/67 (SL/SCL)	20/58 (SL/SCL)	
Yawdim (9)	13"	Bedrock	35/43 (CL)	52/20 (C)	58.9
Yawdim (10)	14"	Bedrock	22/39 (L)	32/22 (CL)	
					2,665.5

*U.S. Department of Agriculture textural classes:

(Slash (/) denotes soil bordering two textural classes.)

C= Clay
CL= Clay Loam
L= Loam
LS= Loamy Sand
SCL= Sandy Clay Loam
SL= Sandy Loam
SiCL= Silty Clay Loam
SiL= Silt Loam

Land disturbed for residences and agricultural fields that have been allowed to revert to rangeland ("go back" lands) is the least extensive class on the mine area--about 40-50 acres. The succession of these "go back" lands has been retarded by heavy grazing; therefore, they are well below their production capacity.

Three small stands of ponderosa pine, occupying only a few acres, lie within the mine area. These stands are not considered important for wildlife habitat, because they are not being used by wildlife now, and because more extensive stands exist south of the mine area.

G. WILDLIFE

Wildlife use the proposed mine extension area infrequently, mainly because of existing mining disturbances at Area B and because the land has been heavily grazed and lacks topographic and vegetative diversity. Adjacent areas, primarily the drainage bottom of East Fork Armells Creek and the bluffs south of the mine area, contain habitat more frequently used by wildlife. Rare, endangered, and threatened species are not known to use the mine area, and there are no fisheries.

The following discussion is based on studies by Ecological Consulting Service (1978).

Pronghorn antelope are the most freqently observed big game animal in or near the proposed mine area. Antelope have been observed on the proposed mine area during the spring, summer, and fall; however, the habitat type most often used by antelope (big sagebrush-grassland) would not be disturbed. No fawning sites have been observed in the proposed mine area. Two separate observations of a doe with a fawn were made within 1 mile of the proposed mine area.

Habitat for sharptail grouse (primarily sagebrush and skunkbush) is not extensive on the area to be mined. No known dancing grounds are in or near the proposed mine area.

Ring-necked pheasants mostly use the East Fork of Armells Creek north of the mine. The pheasants use creek bottom and nearby silver sagebrush habitat types more than other types. The area to be disturbed includes none of the creek bottom type and very little of the adjacent silver sagebush-grassland type.

Few Hungarian partridge use the mine area because of the limited amount of their favored habitat (open shrub grassland near dryland agriculture).

Red-tailed hawks, harriers, rough-legged hawks, and American kestrels use the mine area. Golden eagles and prairie falcons probably use the mine area for hunting. No nests of these or other raptors have been found.

Coyotes are the only large predator observed on the mine area. Most coyotes have been observed in the coniferous forest habitat type with the remainder in the grassland habitat type. Distribution does not appear to change with the season. Observations of coyotes have declined since 1974 in direct response to the increase in fur prices.

H. SOCIAL CONDITIONS

About 400 people live in the Colstrip-Forsyth area as a result of the existing Area B mine--less than 1.5 percent of the total population of those towns. In 1977, 113 miners worked at Area B; an additional 8 ancillary workers in Colstrip and Forsyth were attributable to the mine workers. The families of the miners and ancillary workers accounted for the remainder of the 400. Construction of the Area B mine in 1976 coincided with a population decline due to the near-completion of Colstrip generating units 1 and 2. Rosebud County's population decline from 1976-1977 was about 60 people less than it would have been had there been no mining in Area B.

Local social impacts were fairly severe from 1976-1977; workers from the Area B mine added to those impacts. The previous EIS on Area B (Montana Department of State Lands, 1976) discusses some of the social impacts due to renewed mining which were identified by Gold (1974).

Colstrip, with its small premining population, changed rapidly into an industrial town when Western Energy reopened the old Northern Pacific mine in 1968. Forsyth was less dramatically affected because of its greater size and diversity of social units. Construction of the generating units at Colstrip had greater adverse effects on social conditions in Col Forsyth than mining. Most of the construction workers for the generating units were temporary and did not assimilate into the local society, whereas more of the miners brought their families and settled in the area.

In general, ranchers and those with low or fixed incomes were most severely affected by mining-related social changes. Social impacts identified by Gold (1975) included: shifts in the selection of friends; strains in communicating with friends and neighbors of long standing; a shift in the established power structure from the ranchers to the new mining industrialists; the need to live with constant and increased uncertainties for which planning is difficult; keen interest in monetary gain at the expense of local values; the need to accommodate to newcomers' needs; and a loss in the sense of community. Recent research does not indicate the changes in those impacts that may have occurred since 1975.

Merchants and businessmen in Forsyth and Colstrip generally profited from the population influx beginning in 1968. When the boom from construction of the generating units ended in 1975, some merchants were unprepared for the business decline and were left with overstocked inventories. Some townspeople, however, enjoyed the social and cultural

diversity brought by the new population (FES 80-1, U.S. Department of the Interior and Montana Department of State Lands, 1980).

Local attitudes towards coal mining and the generating units have varied widely and have caused differences among Colstrip and Forsyth residents. FES 79-29 (U.S. Department of the Interior, 1979) and the previous EIS on Area B (Montana Department of State Lands, 1976) document those attitudes. There is no current published information on whether attitudes and the resulting conflicts have changed in the last 4 years.

Colstrip residents are being exposed to levels of atmospheric particulate which exceed the Federal primary air quality standard established to protect human health. There is no evidence to date that respiratory problems among Colstrip residents are more frequent than among the general population, but the high levels of particulate suggest that health problems are a possibility. Little of the particulate in Colstrip comes from Area B, however.

According to FES 79-29 noise levels at some places within generating units 1 and 2 approach or exceed standards set by the U.S. Office of Safety and Health Administration, but most worker's stations within the units are in compliance. Noise from the units within the town of Colstrip could be considered a nuisance but does not approach health standards.

I. ECONOMICS

Data used in this analysis came from the COALTOWN computer model (Temple, 1978). For additional description of the existing economic environment in Rosebud County, see: FES 80-1; FES 79-46; FES 79-29; Rosebud County Planning Board (1979); Meadowlark (1979); and Montana Department of Natural Resources and Conservation (1974).

1. Employment and Income

The reopening of the Rosebud mine by Western Energy in 1968 began to change the structure of the economic base of Rosebud County. The employment base became increasingly dominated by jobs directly associated with the mining and conversion of coal. (See table II-8.) Mining in Area B was an integral but fairly minor part of this process.

By 1977, nearly a quarter of the employment and half of the personal income in the county was directly related to coal mining and power generation. (See table II-9.) Area B did not create any ancillary (indirect) jobs when it opened in 1976. The ancillary sector had excess capacity as a result of the construction peak of units 1 and 2, so Area B helped mitigate the postconstruction decline in ancillary and basic employment.

From 1972-1977, Area B was responsible for about 10 percent of the total employment increases (basic and ancillary) in Rosebud County. (See table II-8.) About 120 persons are now employed at Area B. Only

TABLE II-8.--Employment by broad industry and sector in Rosebud County, 1972-1977

[Source: U.S. Department of Commerce, Regional Economic Information System, 1979]

	1972	1973	1974	1975	1976	1977
Agriculture[1]	682	668	681	623	591	547
Mining	104	269	283	392	416	403
Manufacturing	265	192	180	160	146	52
Federal government	173	174	204	226	221	222
Construction (part)[2]	0	0	0	1,058	400	115
TCU[3] (part)[4]	25	12	11	0	0	7
Total economy	1,249	1,315	1,359	2,459	1,774	1,346
Trade	269	312	346	411	425	367
FIRE[5]	37	43	49	50	61	61
Services[6]	798	845	916	1,221	1,249	1,235
Construction (remain)	39	76	180	296	259	230
TCU[3]	167	181	201	210	226	231
Local and State government	367	402	466	549	559	574
Total ancillary	1,677	1,859	2,158	2,737	2,779	2,698
Total employment	2,926	3,174	3,517	5,196	4,553	4,044

[1]Farm proprietors plus farm wage and salary.
[2]Proportion greater than .0569 of total employment.
[3]Transportation, communications, and utilities.
[4]Proportion greater than .0571 of total employment.
[5]Finance, insurance and real estate.
[6]Includes: other industry wage and salary and nonfarm proprietors.

TABLE II-9.--Derivation of personal income in Rosebud County by place of residence

[Source: U.S. Department of Commerce, Regional Economic Information System, 1979]

Item	1972[1]	1973[1]	1974[1]	1975[2]	1976[2]	1977[2]
Total labor and proprietors income by place of work[3]						
By type						
Wage and salary disbursements	12,556	17,079	21,911	50,598	41,457	36,572
Other labor income	882	1,448	1,854	4,050	4,030	3,958
Proprietors income[4]	3,943	8,529	4,357	1,953	1,683	2,018
Farm	2,165	6,520	2,397	-158	-506	-589
Non-farm[4]	1,778	2,009	1,960	2,111	2,189	2,607
By industry						
Farm	3,727	8,326	4,568	1,814	1,215	949
Non-farm	13,654	18,730	23,554	54,787	45,955	41,599
Private	10,405	15,031	19,057	49,005	40,066	34,747
Ag. serv., for., fish., and other[5]	146	119	128	152	333	211
Mining	1,285	4,279	4,914	8,291	10,237	10,575
Construction	534	1,020	3,389	26,952	14,794	8,969
Manufacturing	1,347	1,117	1,239	1,198	938	595
Non-durable goods	908	676	689	681	677	237
Durable goods	439	441	550	517	261	358
Transportation and public utilities	2,171	2,489	2,882	3,030	3,593	4,064
Wholesale trade	218	256	294	454	482	472
Retail trade	1,488	1,877	2,002	2,555	2,659	2,546
Finance, insurance, and real estate	275	312	375	404	585	638
Services	2,941	3,562	3,834	5,969	6,445	6,677
Government and government enterprises	3,249	3,699	4,497	5,782	5,889	6,852
Federal, civilian	1,240	1,365	1,638	2,047	1,746	2,267
Federal, military	81	90	110	139	143	155
State and local	1,928	2,244	2,749	3,596	4,000	4,430
Derivation of personal income by place of residence						
Total labor and proprietors income by place of work	17,381	27,056	28,122	56,601	47,170	42,548
Less: personal contributions for social insurance by place of work	721	1,066	1,371	3,127	2,505	2,139
Net labor and proprietors income by place of work	16,600	25,990	26,751	53,474	44,665	40,409
Plus: residence adjustment	-1,020	-1,466	-1,912	-10,841	-6,441	-4,976
Net labor and proprietors income by place of residence	15,640	24,524	24,839	42,633	38,224	35,433
Plus: dividends, interest, and rent[7]	2,508	3,338	4,309	5,149	5,877	6,623
Plus: transfer payments	2,546	3,013	3,565	4,426	5,246	5,500
Personal income by place of residence	20,694	30,875	32,713	52,208	49,347	47,556

[1]Estimates based on 1967 SIC.
[2]Estimates based on 1972 SIC.
[3]Consists of wage and salary disbursement, other labor income, and proprietors income. Primary source for private non-farm wages: ES-202 covered wages - Montana Employment Security Commission.
[4]Includes the capital consumption adjustment for non-farm proprietors.
[5]Includes wage and salaries of U.S. residents working for international organizations.
[7]Includes the capital consumption adjustment for rental income of persons.

a few jobs in the ancillary sector exist because of Area B. Area B contributed about one-third of the employment growth due to the entire Rosebud mine.

The mine employees are, on the average, better paid than workers in other economic sectors in Rosebud County. Average wages in the mining and construction sectors in 1977 were about $26,000; in manufacturing, $11,400; in trade, $8,400; and in services, $5,400. (See tables II-8 and II-9.)

2. Taxation

Fiscal conditions in Rosebud County have been described in detail in chapter 7 of the Rosebud County Planning Data Book (Rosebud County Planning Board, 1979), which is incorporated by reference.

Recent coal development in Rosebud County has had a major effect on the fiscal structure of Rosebud County. The taxable value associated with gross proceeds of the Western Energy and Peabody mines and the property of Montana Power's two coal-fired generating units have become the major source of the county's tax revenue. In 1970 the two categories represented less than one-fifth of the taxable value; by 1978, they exceeded three-fourths. This rapid growth in taxable value--nearly sevenfold between 1970 and 1978--is largely responsible for the decline in the county's tax rate, which fell from 54.55 mills in fiscal year 1971 to 26.632 mills in fiscal 1979.

This growth in taxable value occurred primarily near Colstrip and therefore has also benefited the Colstrip school districts. (See fig. II-4.)

Coal development has not equally helped all taxing jurisdictions in Rosebud County. The total mill levy in Forsyth has remained relatively constant, because the additional revenues needed to accomodate coal-induced growth has largely offset the reduction in the county's tax rate.

J. COMMUNITY SERVICES

Community services in Rosebud County are not expected to be adversely affected by the Area B extension, and are thus not described in detail here. A detailed description of community services in the county is contained in chapter 6 of the Planning Data Book and Comprehensive Plan (Rosebud County Planning Board, 1979), and in FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980).

Most community services and facilities in Rosebud County and its towns are now adequate. Social and physical services were expanded to accomodate the new population associated with Colstrip generating units 1 and 2. Between 1974 and 1978, more than $16 million worth of capital improvements (schools, water, sewer, fire, and police) were made in

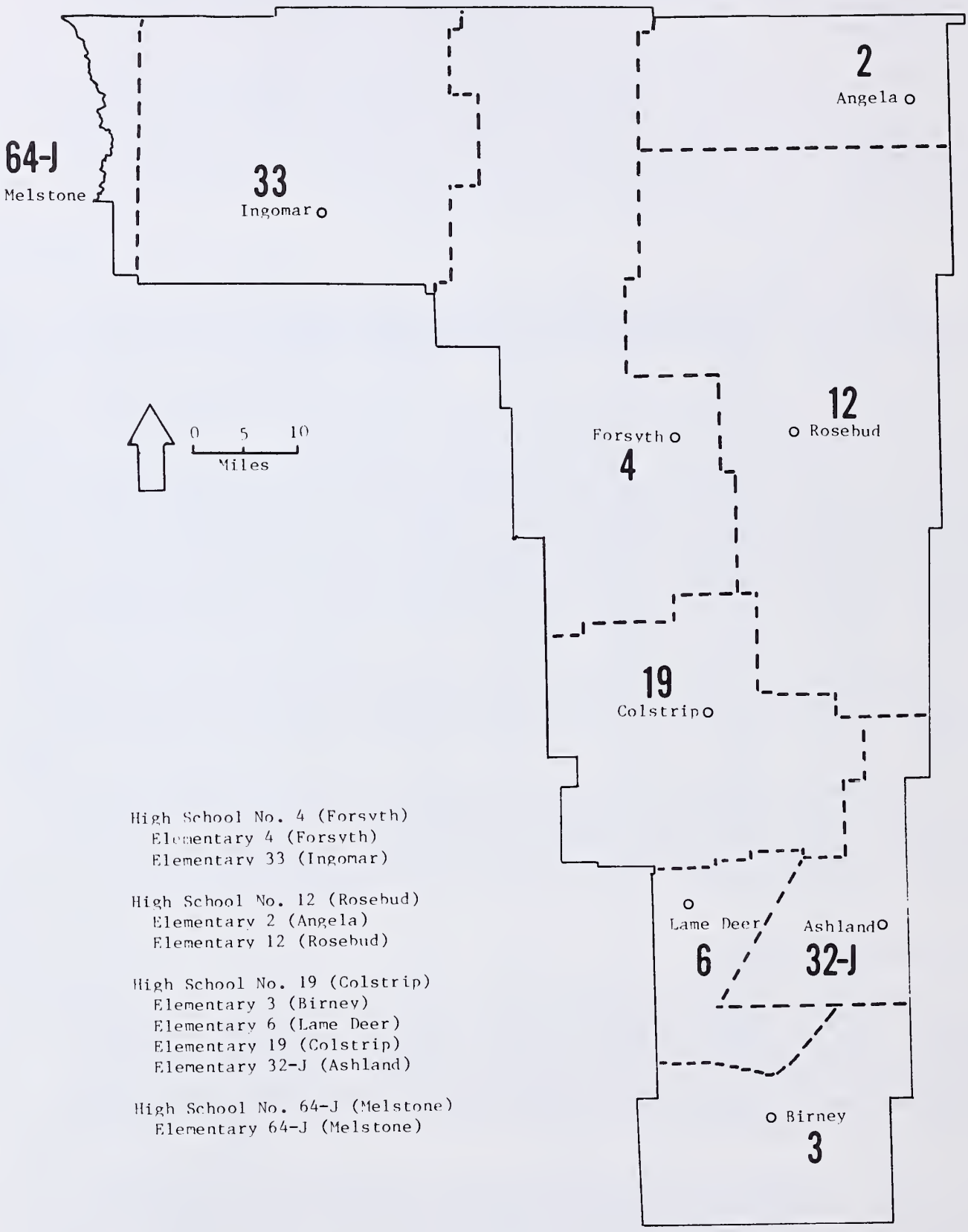

FIGURE II-4.--Rosebud County school districts.

the county. A little over half of the improvements were financed with grants from the Montana Coal Board.

In Rosebud County, social and medical services are in shortest supply. People often have to travel to Miles City or Billings for medical care. Mental health and drug abuse programs are understaffed and underfunded. These problems existed in some degree before the recent upsurge in coal development, and are common in rural areas of the northern Great Plains.

K. LAND USE

Neither the land use pattern nor the productivity of the land on the 1,366 acres of the proposed Area B extension is markedly different from that in the rest of Western Energy's leaseholds, Rosebud County, or southeastern Montana. All but about 120 acres of the 1,366 acres were being used for rangeland when Area B opened. (See table III-3.) The normal productivity of the mine area is average for southeastern Montana, between .25 and .30 animal unit months (AUM's)/acre.

Mining in Area B has already disturbed about 380 acres (see table III-3), about 160 of which are currently being reclaimed. As yet, there has been no long term monitoring of reclaimed surfaces in the northern Great Plains and it is not known what the long-term productivity potential of such land would be. For the short term (5 to 7 years after reclamation begins), vegetative productivity on the better sites will probably increase sharply. An equally rapid decline will probably be followed by a gradual increase (FES 80-1, volume 1, chapter II, Soils and Vegetation).

The cumulative land use impacts of the recent coal development in Rosebud County have been principally confined to the Colstrip and Forsyth vicinities and the transportation corridor between the two towns. About 1,720 acres of agricultural land have been temporarily displaced by mining (1,300 acres of rangeland and 420 acres of cropland). About an additional 550 acres in Colstrip and Forsyth have been permanently devoted to urban and industrial uses during the same time (Meadowlark, 1978; Rosebud County Planning Board, 1979; FES 79-46; and Michael Shea, Western Energy Company, oral commun., 1979).

The current general land use pattern in Rosebud County is described in detail in chapter three of the Planning Data Book and Comprehensive Plan (Rosebud County Planning Board, 1979). This information is incorporated by reference. The cumulative impacts of coal mining to date represent 0.07 percent of the grazing resource of Rosebud County's 2.5 million acres of range and pasture land and 0.3 percent of the nearly 130,000 acres of cropland.

L. TRANSPORTATION

Most people in the sparsely-populated Colstrip area travel by road. The road network, although not well developed, is generally adequate for

the existing population. The main highways linking Colstrip with Forsyth and Lame Deer have been heavily used when mines and generating units were under construction.

Graveled county roads and two-lane State highways (fig. II-5) service the Colstrip area. Federal Aid Primary (FAP) 39 connects Colstrip with Interstate 94, the major east-west highway, to the north, and with FAP 37 (U.S. 212), a heavily used east-west highway, to the south. FAP 39 has four railroad crossings and originated for agricultural use; now it carries most of Colstrip's traffic. The Montana Department of Highways will improve 31 miles of FAP 39 between Interstate 94 and FAP 37 to meet existing and projected traffic demands. (See fig. II-5.)

FAP 37, intersecting FAP 39 at Lame Deer to the south, leads west to Busby, Crow Agency, and Hardin. Heavily used by trucks, this two-lane road presents dangerous driving conditions. The Highway Department is currently improving 24 miles of FAP 37 between Crow Agency and Busby (fig. II-5).

Traffic on the major highways leading to Colstrip has increased considerably betwen 1970 and 1978. (See table II-10.) Traffic on FAP 37 has increased about 60 percent. Traffic on FAP 39 from Colstrip to Interstate I-94 increased about 350 percent from 1970 to 1978. The Montana Department of Highways considers FAP 39 to be extremely unsafe --they rate it 1 on a scale of 20 for safety (Montana Department of Highways, 1978).

A railroad spur connects Colstrip and the Burlington Northern (BN) main-line 25 miles to the north near Nichols. (See fig. II-5.) The spur services both Western Energy's Rosebud mine and Peabody's Big Sky mine 7.5 miles south of Colstrip. Coal from the Colstrip mine is shipped to such places as Billings, Montana; St. Paul, Minnesota; and Bayfront, Wisconsin.

The Colstrip spur, with its many railroad crossings, has been the source of several accidents (FES 80-1, volume 1, table II-44). About 25 unit trains/week currently leave the Big Sky and Colstrip railroad crossings, causing occasional traffic delays on FAP 39 (David Morgan, Montana Department of Highways, oral commun., October 1979).

M. RECREATION

No developed recreation facilities are in the permit area. The mine area is privately owned, and the opportunities for public use limited. Recreation facilities are found in adjacent communities within Rosebud County, most notably in Colstrip.

Outdoor recreation in the Colstrip area includes hunting, picnicking, camping, hiking, horseback riding, vehicular recreation, and winter trail activities, including snowmobiling. The Yellowstone River and its tributaries provide fishing and other water-related activities.

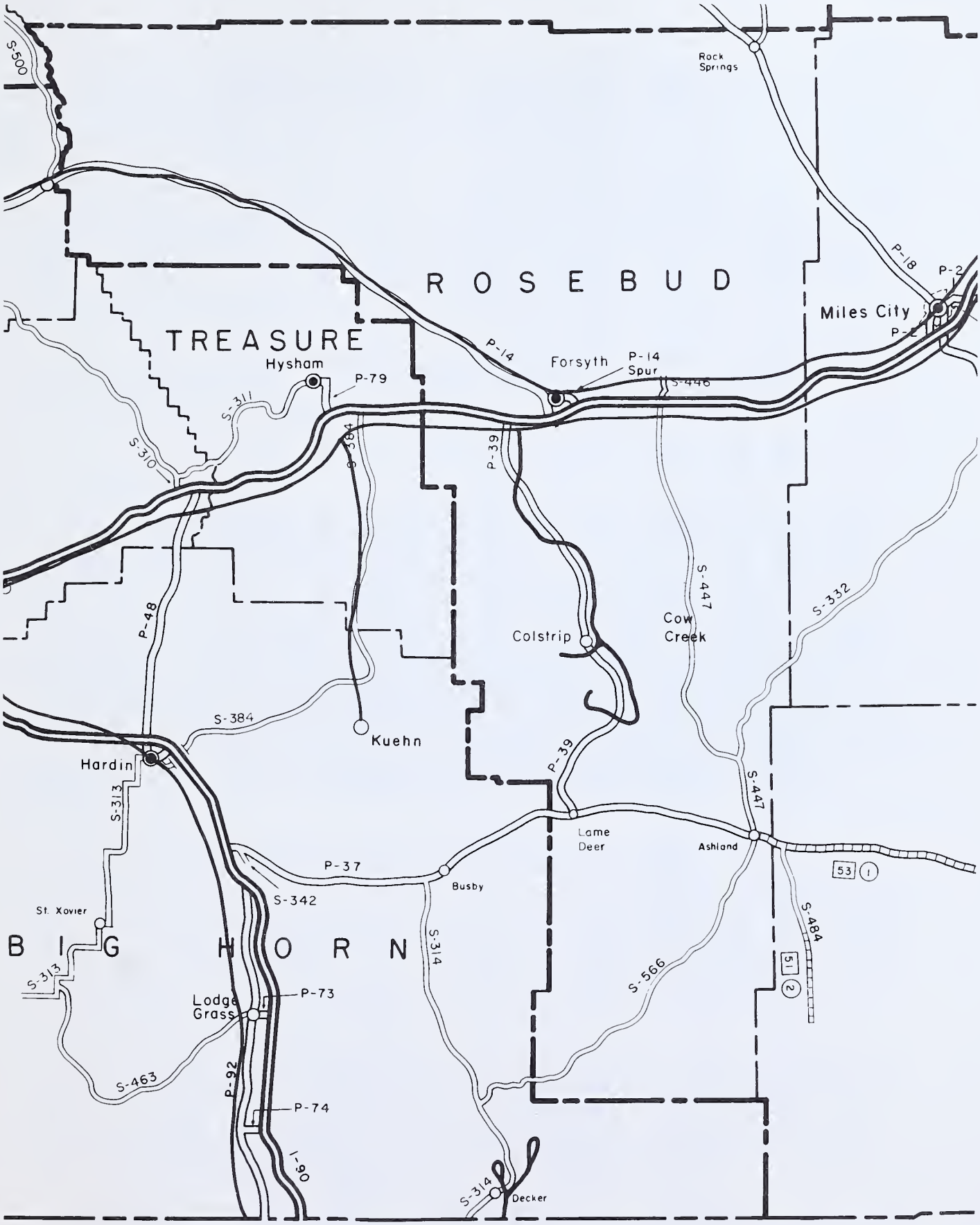

FIGURE II-5.--Transportation routes near Colstrip. Railroads--solid black lines; roads--parallel lines; highways being upgraded--dashes.

TABLE II-10.--Average daily traffic counts for highways near Area B, 1968-1978

[Source: Bob Keck, Montana Department of Highways]

Highway segment	Year										
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
FAP 37											
Jct. 342 to Busby.....	673	603	657	701	766	860	778	791	1,052	1,443	1,159
Busby to Rosebud County line.....	782	773	802	766	854	924	914	1,072	1,223	1,585	1,153
Rosebud County line to Lame Deer.....	858	850	863	820	962	1,033	1,011	1,263	1,243	1,800	1,370
FAP 39											
Lame Deer to Reservation boundary.....	238	274	320	363	395	---	---	---	359	511	585
Reservation boundary to Colstrip.....	159	170	195	203	269	508	451	498	388	344	364
Colstrip to I-94 interchange.....	210	190	236	253	370	1,193	1,047	1,425	1,087	783	678

Urban recreation facilities in and near Colstrip include a 51-acre park system, a swimming pool, three tennis courts, three basketball courts, and five tot lots. A 16,000-square foot community center includes an exercise room and courts for basketball, handball, and racquetball.

The Colstrip recreation facilities are currently being used at their maximum capacity. Several new recreation sites and facilities have been proposed for the town of Colstrip, including a swimming beach with bath houses, a 9-hole golf course, bike paths, equestrian facilities, and additional ball fields and tennis courts (FES 80-1, U.S. Department of the Interior and Montana Department of State Lands, 1980).

For additional information, see FES 79-29 (U.S. Department of the Interior, 1979), Volume 1 of FES 80-1, and FES 79-46 (U.S. Department of the Interior and Montana Department of State Lands, 1979).

N. CULTURAL RESOURCES

When the Draft EIS on Area B was issued, two archaeological sites had been identified within the mine area, and one historical site had been identified just outside the mine area (Fredlund, 1978). None of those sites qualify for nomination to the National Register of Historic Places, based on a resurvey conducted by Fredlund (1980). The resurvey was required by the Montana State Historic Preservation Officer and the U.S. Office of Surface Mining. The resurvey disclosed a previously unidentified archeological site termed R. S. Kimball in section 9, T. 1 N., R. 41 E. Additional survey work conducted by Fredlund (1980) recommended that the Kimball site, which consists of flakes and bone to a depth of 45 cm, not be included on the National Register of Historic Places.

The Old Homestead Site has been interpreted as a single-component, late-prehistoric bison kill and butcher site (about 1,000 years A.D.). Projectile points, broken and burnt bison bones, skinning and butchering tools, and three hearths were unearthed, but none of these is considered unique. The Well Collected Site was so named because amateur collectors removed or disturbed much of the original materials. This site may have been a rather extensive occupational site, but previous disturbances prevent further interpretation.

The West Homestead Site contains buildings made of cottonwood which are in various stages of collapse. The buildings, their structural style, and their history are typical of homesteads in the region. This site is immediately adjacent to West Fork Armells Creek and is outside the area to be disturbed under the proposed permit.

No rock art, rock shelters, or standing structures were found within the 1 mile buffer zone that had been intially inventoried. DSL requires a buffer zone to preserve, to the extent possible, important cultural resources from the effects of blasting.

O. ESTHETICS

The mine area, although visually pleasant, is not esthetically distinctive. Area B contains fewer sandstone outcrops and less rugged topography than other parts of Western Energy's leasehold or the area around the Big Sky mine to the south.

The vegetation in Area B, mostly rangeland with scattered small stands of ponderosa pine, is well represented around Colstrip. Heavy grazing has lowered the area's attractiveness by reducing ground cover and making the vegetation appear clipped.

Landforms in Area B are typical of the Colstrip area. The most interesting feature is the bluffs rising several hundred feet at the south end of the area. Small buttes and ridges rise 50-100 feet above the rolling land between East Fork Armells Creek and the bluffs. The buttes and the bluffs have exposed sandstone outcrops which are attractive but not unusual in the Colstrip area. Some of the buttes and bluffs have reddish-tinged clinker outcrops which add to visual diversity, but more striking clinker beds are visible elsewhere around Colstrip. The top of one scoria outcrop south of the mine is now being excavated for use on haul roads at Area B.

Most of Area B, including the spoil piles from existing mining operations, is visible from the State highway FAP 39 for several miles south of Colstrip and from the county road along East Fork Armells Creek. Because much of the land around Colstrip is dominated by industrial sights and sounds, the visible part of the Area B mine is unobtrusive.

Few occupied ranch homes are within hearing range of the blasting at Area B; only one is within close visual range of the mine. Colstrip residents can hear and see the mine but other sounds from nearby Areas A and E and from the generating units are more obtrusive.

CHAPTER III

IMPACTS OF WESTERN ENERGY'S PROPOSAL

This chapter describes the environmental impacts of the mining and reclamation plan ("mine plan") proposed by Western Energy Company. The analysis considers mitigating measures proposed by Western Energy in its permit application. Text changed in response to comments is underlined.

Each section of this chapter begins with a summary of the anticipated environmental impacts. An impact on a resource is termed "significant" if it would exceed legal standards; if it would severely conflict with the use of the resource; or if it could reasonably be mitigated in an alternative mine plan.

A. GEOLOGY

1. Topography and Geomorphology

Impacts on topography and geomorphology from the Area B extension would not be significant, because the company's mine plan would minimize erosion, which would allow optimum vegetation growth. Western Energy has agreed to construct complex slopes on the regraded topography of Area B. The complex slopes would be less erosive than the long, uniform slopes originally proposed by the company (Wischmeyer and Meyer, 1973, p. 26). Complex slopes--steepening at the top, straight and steep in the middle, and dish-shaped at the bottom--reduce the velocity of water by lessening the steepness of the lower slope where runoff concentrates.

The company has also committed to the selective redistribution of sandy-textured soils (such as the Busby series) on regraded slopes of 10 percent or less. In addition, the company would not redistribute sandy soils such as the Busby on the steeper portions of drainage channels. Mulch would be applied to slopes greater than 10 percent, which would further reduce erosion until vegetation is established.

Erosion of unreclaimed and partially reclaimed areas would be higher than premining erosion rates, but once a vegetation cover is established the landscape would probably be relatively stable.

Western Energy would construct sedimentation ponds between the active mine area and East Fork Armells Creek. Those ponds would capture nearly all of the sediment that would be eroded from unreclaimed and partially reclaimed areas. The ponds would remain in place until the postmining landscape were no more erosive than the undisturbed (premining) landscape.

2. Overburden

Impacts on vegetative reclamation from the replaced overburden at Area B would be moderately severe locally but generally insignificant for the disturbed area as a whole. Placement of isolated pockets of certain overburden materials near the surface may cause various soil properties, such as salt, zinc, cadmium, and molybdenum, to limit the

success of reclamation in spots probably no greater than 1/10 acre. If such problems were to develop the Department could require Western Energy to dig up the problem material, replace it with suitable material, and reseed the area. The problem spots would probably be no larger than the small saline seep areas or intermittent ponds found on some undisturbed rangeland in the region.

Western Energy has committed to sampling the regraded spoils at an intensity of 1 hole per 2 acres to delineate clayey materials, which would then be selectively placed between the rooting zone and the ground water zone so as not to affect reclamation.

Increased molybdenum (Mo) levels exhibited throughout the mine area (table II-1) may potentially be a problem. The importance of Mo levels has not yet been established for plants other than legumes, and legumes are not expected to be dominant in the reclaimed vegetative communities. Elevated Mo is associated with depressed copper (Cu) levels in plant tissues, especially in white and yellow sweet clover (Erdman and others, 1978). Animals grazing primarily on low Cu plants would be susceptible to molybdenosis, resulting in reduced growth rates, poor health, and, in extreme cases, death. Elevated Mo levels would probably not affect the success of revegetation.

Elevated salt levels in sections 9 and 10 may affect ground water quality. Water quality may also be affected by elevated phosphorus levels.

Locally elevated levels of cadmium in core hole N45-E52 in section 4 could slightly reduce vegetative quality. A significant adverse affect on grazing animals is not likely because elevated cadmium levels are not widespread, and because the reported values do not greatly exceed the State suspect level.

Zinc levels in one core hole in section 9 slightly exceed the State suspect level, but probably not so much as to inhibit vegetative reclamation success, due to the relatively low volume of affected material (28 percent). Zinc levels in core hole N45-E54 of section 4 are higher than those found in the core hole in section 9. The core hole in section 4 may have been contaminated during drilling; however, even if the values were accurate the zinc would not significantly inhibit revegetation because the volume of the material is less than 15 percent of the total core hole. The concentrations of zinc would therefore likely be reduced through dilution (Dollhopf and others, 1978).

B. HYDROLOGY

Hydrologic impacts from Area B would be moderately significant. Impounding ephemeral runoff from Area B would alter the runoff pattern and increase the salinity of East Fork Armells Creek. This could slightly lower agricultural productivity downstream for at least 2 decades--1 decade

for the remainder of mining, and another decade until the ponds could be removed. Poor quality water in the regraded spoils would very slightly reduce water quality in East Fork Armells Creek.

1. Ground Water

After the Draft EIS on Area B was issued, the Department of State Lands required Western Energy to drill wells along the northern edge of Area B where the initial mine pit (box cut) could cut into gravels of East Fork Armells Creek. The drilling identified more of those gravels within the box cut area than previously thought. Mining as proposed would intercept approximately 420 feet of gravels in the southeastern quarter of section 4. The box cut would also intercept approximately 1,800 feet of East Fork and tributary gravels in the southwest quarter of section 4. This would probably drain most of the ground water from the gravels of East Fork at a rate of about 110 gallons/minute (gpm) for the first month, stabilizing at about 50 gpm. This could lower ground water levels up to 2 miles downstream for 35 to 100 days, when the box cut would be filled in. Lowered water levels under the terraces along East Fork could reduce the vegetative productivity on the terraces. In order to prevent this problem, the Department would probably require Western Energy to line the edge of the box cut with an impermeable material or keep the box cut away from the saturated gravels (see chapter IV, Mitigating Measures, Hydrology).

During mining, ground water in the Rosebud coal seam intercepted by the active pit would be used to water haul roads or be diverted to settling ponds. The amounts diverted would be minor, because the Rosebud coal seam transports little water relative to the alluvium of East Fork Armells Creek to the north. Ground water diverted into settling ponds would evaporate, seep into nearby ground- or surface waters, or be released to East Fork Armells Creek under Western Energy's discharge permit with the Montana Department of Health and Environmental Sciences (see Surface Water).

While the impoundments are in place (at least 10 years after mining) the problem of waterlogging observed in a rancher's hay meadow on Armells Creek north of Colstrip could be slightly worsened. The effect is not expected to be large because mining would not greatly increase the amount of ground water ultimately discharging into the flow system of East Fork Armells Creek, and because Western Energy has agreed to discharge most impounded surface waters detained in sedimentation ponds within 15 days. As a result, less impounded water would be forced into the shallow ground water system of East Fork than would be the case if the full volume of the ponds were detained (see Surface Water). Possible causes of the waterlogging are discussed in chapter II, Hydrology, and in FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980).

Ground water quality in the spoils would be considerably reduced for the long term (beyond mine life); this would very slightly reduce the quality of water in East Fork Armells Creek, owing to dilution.

The quality of water in East Fork would probably remain within the range normally found in that creek at Colstrip. Ground water in spoils from the old Northern Pacific mine around Area E contains an average of 2-1/2 times the total dissolved solids found in the undisturbed Rosebud aquifer, based on data in Van Voast and others (1978) and Dollhopf and others (1979). Recent data on ground water quality within Area B mine spoils indicates that at least at first, total dissolved solids would be as high as that found in the old Northern Pacific spoils (which average 3,400 mg/L TDS). After Area B is reclaimed most of the precipitation that falls on the minesite would be consumed by vegetation so that TDS levels in the spoils would not be as high as in the old Northern Pacific spoils. Total dissolved solids in East Fork would probably increase, however, as would concentrations of minor trace elements (Van Voast and others, 1977; 1978).

The premining direction of ground water flow into East Fork Armells Creek and to the east would be reestablished as replaced spoils became saturated. After several years or perhaps decades, the direction of flow would approximate premining conditions (see chapter II, Hydrology).

Two stock wells would be mined out and would be replaced as part of the reclamation process.

2. Surface Water

Water held in impoundments at Area B would decline in quality, owing to contact with mine spoils and evaporative concentration. Excess water released from the impoundments would lower the quality of water in East Fork Armells Creek very slightly, owing to dilution. Water not released from the impoundments would seep into surface and ground waters of East Fork, which would add to the impacts on that stream. Western Energy would partially mitigate this impact by releasing excess flood runoff impounded in sediment ponds within 15 days. This would reduce evaporation and contact with mine spoils.

Flood flows may be slightly altered by the 15-day retention of surface runoff from Area B. The peak discharge of flood flows (in response to a quick snowmelt or a large rainstorm) would be slightly lower than premining conditions because Area B sedimentation ponds would detain runoff from 10 percent of the drainage area of East Fork Armells Creek. Because runoff would be released somewhat later than the normal flood flow, nonpeak flows could be slightly larger. This could cause problems for ranchers downstream, who want the flood flow to irrigate their hay fields but want the fields to dry up afterwards. The exact amount that the proposed mining in Area B would affect runoff volumes and timing cannot be estimated from available data; further study would help resolve this question (see chapter IV, Mitigating Measures). Disruption of the runoff pattern could be minimized by releasing runoff in excess of the sediment storage volume (see chapter IV, Mitigating Measures).

The impoundments would capture most of the sediment that erodes from the minesite; after reclamation, erosion and sedimentation is expected to be similar to the premining condition (see Geology).

The spring in the NE 1/4 of the NE 1/4 of section 8 (fig. II-1) would probably dry up, because its assumed recharge area would be removed by mining. The loss would not be significant because water for livestock use is available nearby. There are no known means to reestablish the spring.

Surface water runoff from undisturbed areas in the ephemeral watersheds above the active pit would be diverted around the disturbed area and into the sediment ponds, or used to water haul roads. The entire Rosebud mine uses about 69 acre-feet/year to water haul roads; about one-third of that amount would be used at Area B (Michael Shea, Western Energy Company, oral commun., April, 1980). When other water is not available, roads and ramps are watered with industrial wastewater from ponds at the Colstrip generating units. That water is very saline and is used only as a last resort.

C. CLIMATE

Climate in the Colstrip area would not be measurably affected by particulate and gaseous emissions from the Area B extension. The generating units at Colstrip would emit much more of the particulate and gases that could potentially change local precipitation and temperature, but even the generating units would most likely have only minor effects on the climate (FES 80-1, U.S. Department of the Interior and Montana Department of State Lands, 1980).

D. AIR QUALITY

Particulate and gaseous emissions from Area B would contribute slightly to the significantly reduced air quality in the Colstrip area--an area designated a "nonattainment area" for repeatedly exceeding Federal primary air quality standards. Impacts on air quality from the Area B extension would not be significant, however, because even if Area B were shut down, pollutant levels in the town of Colstrip would not be measurably reduced.

During occasional high winds, residents of Colstrip would probably continue to be exposed to high dust concentrations originating primarily from the coal storage piles at the mine loadout and the generating units. Coal from Area B makes up about one-third of the loadout storage piles.

Miners would occasionally be exposed to potentially hazardous concentrations of total suspended particulate (TSP). Because the Montana State Implementation Plan "significant harm" level of 1,000 ug/m^3 for 24 hours has been exceeded in the past, it would probably be exceeded in the future. Measures that can mitigate these impacts are discussed in chapter IV, Mitigating Measures. Mining would not affect the class I airshed of the Northern Cheyenne Indian Reservation.

At an annual production rate of 2.9×10^6 tons, the potential particulate emissions would total about 2,500 tons/year (table III-1). The accuracy of emission factors is subject to much debate; until more information is available, the calculated emission should be used for comparison only. Control measures proposed by Western Energy would reduce those emissions to 1,100 tons/year--a 56 percent reduction.

Coal dust would account for 45 percent of the controlled emissions total; noncoal (soil overburden and topsoil) particulate for 53 percent; and exhaust particulate emissions for 2 percent.

Coal particulate emissions would total over 500 tons/year. The transfer and storage of crushed coal would account for over 90 percent (479 tons) of these emissions. Because the crushed coal is "dropped" from the stacker to the storage pile, small particles are suspended and may travel long distances. Wind may also erode fine particulate from the storage piles and deposit it off the permit area. Dust plumes may rise as high as 2,500 feet and disperse as far as 7.5 miles downwind from the Rosebud mine (David Maughan, Montana Air Quality Bureau, oral commun., 1978). Coal dust deposited on vegetation may cause leaf lesions, stomatal clogging, and fruit set reduction (Rao, 1971). Dustfall rates measured by Rao (2.6 to 541 tons/mile^2/month) were similar to those measured in the Colstrip area. Unit trains may lose up to 1 percent of their coal in the form of dust (Michael Shea, Western Energy Company, written commun., 1978).

Noncoal particulate emissions would range from an estimated 456 to 766 tons/year. The primary source of soil particulate would be overburden removal and dumping. Only when the dragline operated close to the permit boundary, or during rare high winds (see chapter II, Climate), would large amounts of soil particulate escape from the mine area. Haul road traffic and wind erosion of exposed areas would be the other major sources of soil particulate. The controlled emission rate of 98 tons/year from haul roads would occasionally reduce visibility on the adjacent county road, as would dust emissions from coal and overburden blasting.

The anticipated increase in gaseous emissions is presented in table III-2. The concentrations are not expected to pose health problems. Emissions from unit-train diesel engines may temporarily increase ambient NO_x concentrations adjacent to the railroad corridor.

E. SOILS

Impacts on soils would be insignificant, because the company's mine plan would maximize the soils resource potential. This would limit impacts on soils to those which are unavoidable under any reasonable mine plan. The company has agreed to a complex slope configuration for steeper slopes and would selectively place sandy-textured soil such as the Busby series only on regraded slopes of 10 percent or less, where it would be less erosive than if placed on steep slopes. Placement of

TABLE III-1.--Estimated potential and controlled particulate emissions from Area B

Activity	Extent of activity per year	Emission factor	Uncontrolled emissions (tons/year) Coal	Uncontrolled emissions (tons/year) Other particulates	Reference	Control proposed by Western Energy	Percent efficiency	Controlled emissions Coal	Controlled emissions Other	BACT control strategy	Percent efficiency	BACT controlled Coal	BACT controlled Other
Topsoil and subsoil													
Removal----------	324,000 yd^3	0.38 lbs/yd^3		61.6	1	---	---		61.6	---	---		61.6
Replacement-------	324,000 yd^3	0.38 lbs/yd^3		61.6					61.6				61.6
Exposed areas--------	85.9 acres	8.30 tons/acre		713	4	Stabilization via revegetation within one growing season	75		178	Revegetation within one growing season	75		178
Overburden drilling--	1,850 holes	1.5 lb/hole		1.4	1	---	---		1.4	Bag collector	90		0.1
Overburden blasting--	53 blasts	14.2-85.3 lb/blast		0.4-2.3	1	---	---		0.4-2.3	---	---		0.4-2.3
Overburden removal---	13 x 10^6 yd^3	0.0056-0.053 lb/yd^3		36.4-344.5	1	---	---		36.4-344.5	---	---		36.4-344.5
Coal drilling--------	6,015 holes	0.22 lb/hole	0.7		1	---	---	0.7	---	Bag collector	90	0.1	
Coal blasting--------	250 blasts	25.1-78.1 lb/blast	3.1-9.8		1	---	---	3.1-9.8	---	---	---	3.1-9.8	
Coal removal---------	2.9 x 10^6 tons	0.0035-0.014 lb/ton	5.1-20.3		1	---	---	5.1-20.3	---	---	---	5.1-20.3	
Haul road traffic----	154,000 vmt	8.48 lb/vmt*		653		Treatment with $CaCl_2$	85		97.9	Treatment with $CaCl_2$	85		97.9
Coal dumping---------	2.9 x 10^6 tons	0.007-0.027 lb/ton	10.2-39.2		1	---	---	10.2-39.2	---	Negative pressure system	85	1.5-5.9	
Coal screening-------	2.9 x 10^6 tons	0.1 lb/ton	145		1	Enclosed	50	72.5	---	Baghouse	99	0.7	
Coal crushing													
Primary----------	2.9 x 10^6 tons	0.02 lb/ton	29.0		1	Enclosed	50	14.5	---	Baghouse	99	0.3	
Secondary----------	882,000 tons	0.06 lb/ton	26.5		1	Enclosed	50	13.2	---	Baghouse	99	0.3	
Conveyors and transfer points----	2.9 x 10^6 tons	0.2 lb/ton	290		1	partially covered	90	29	---	Fully covered	100	0	
Train loading--------	2.9 x 10^6 tons	0.0002 lb/ton	0.3		1	---	---	0.3	---	Retractable chute	95	0	
Coal storage---------	3.5 surface acres (33.5% Area B coal)	1.6 u lb/acre/hr	19.8		1	---	---	19.8	---	Enclosed	99	0.2	
Surge pile----------	1.6 surface acres (33.5% Area B coal)	u = 3.3 m/sec	9.1		1	---	---	9.1	---	Enclosed	99	0.1	
Coal stacker--------	2.9 x 10^6 tons	0.204 lb/ton	296		2	---	---	296	---	Enclosed	99	3.0	
Diesel fuel----------	500,000 gal.	23.7 lb/10^3 gal		5.9	2	---	---		5.9	---	---		5.9
Gasoline------------	48,000 gal.	12 lb/10^3 gal		0.3	2	---	---		0.3	---	---		0.3
Unit trains---------	294												
Distance traveled--	82 mile round trip Colstrip to Forsyth	1.07 lb/mile		12.9	3	---	---		12.9	---	---		12.9
Coal transported---	2.9 x 10^6 tons	Unknown	Unknown			---	---	---	---	---	---		
		Total	835-886 (avg.) 860	1547-1857 (avg.) 1702				474-524 (avg.) 499	456-766 (avg.) 611			14.5-40.9 (avg.) 27.7	455-765 (avg.) 610
		Percent control						42.0	64.1			96.8	64.2

[1]U.S. Environmental Protection Agency (1979).
[2]U.S. Environmental Protection Agency (1976).
[3]URS (1976).
[4]Bohn and Cowherd (1977)

*Includes only particles less than 30 microns in diameter which may be suspended indefinitely.

TABLE III-2.--Estimated annual gaseous emissions from the Area B extension (tons/year)

Activity	Extent of activity/year	NO_x	SO_x	HC	CO	Aldehydes	Organic acids	HCN
Blasting[1]	1,243 tons ANFO[5]	2.0	---	---	26.5	---	---	0.1
Unit trains[2]	2,234 miles	190.8	29.4	48	67.2	2.9	3.6	---
Diesel fuel[3]	500,000 gals.	104.8	7.8	10.6	23.3	2.4	---	---
Gasoline[4]	48,000 gals.[6] 720,000 miles	10.1	0.3	10.8	136.8	5.3	3.6	0.1
Rosebud County population increase to 1990	341 people	58.0	23.9	44.3	115.9	---	---	---
Total		365.7	61.4	113.7	369.7	5.3	3.6	0.1

[1]Chaiken and others (1974).
[2]URS (1976).
[3]U.S. Environmental Protection Agency (1976).
[4]U.S. Environmental Protection Agency (1973).
[5]Ammonium nitrate-fuel oil, an explosive.
[6]At an assumed 15 miles/gallon.

sandy soils on lesser slopes would increase the effective moisture available to plants because surface runoff and downslope movement of water through the soil would be decreased. Western Energy also would have a soil scientist in the field to delineate soil salvage depths. This would allow for maximum recovery of important soils.

Some impacts on the soils of Area B could not be avoided. These impacts include loss of structure, organic matter, pore space, pore continuity, and developed profiles. These and other related impacts, in turn, would result in increased runoff and erosion, reduced infiltration and percolation rates, and reduced water holding capacity. An apparent exception to decreased infiltration rates has been reported by Schafer and others (1979). Unavoidable impacts are addressed in detail in chapter IV, Soils, of FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980).

Sensitive management of any mined and reclaimed area is important during the decades following mining. Due to loss of structure and other unavoidable effects of disturbance, the replaced soils at and near the surface would be more sensitive to heavy grazing or motor vehicle use than undisturbed native range soils. Even sporadic agricultural misuse would have detrimental effects which would last indefinitely. The problems associated with long term management are discussed in greater detail in FES 80-1.

F. VEGETATION

The loss of 1,083 acres of vegetation within the mine area would not be significant, because the intended use of the land for livestock grazing would not be greatly curtailed following mining. Localized failures may occur after revegetation; such local failures would greatly lower postmining use for livestock grazing only if they occurred after final bond release when the company could not be required to correct the problem. Erosion and sedimentation would be kept to a minimum (see Geology), allowing optimum plant growth. The seeding mixtures proposed by Western Energy would reestablish diverse, predominately native species if properly managed. Proper management would have to take place before bond could be released. Western Energy's proposed revegetation plan is discussed in the technical environmental analysis of Western Energy Company's Area B mine which is on file with the Department.

Although seeding of the mined area would likely establish a vegetation cover on most of the graded and topsoiled lands during the first few years following mining, localized failures resulting from erosion and drought may occur and would require additional reclamation efforts to ensure vegetation establishment. Localized revegetation failures have occurred in the past, the most recent being the 1979 spring seeding which required reseeding in fall, 1979. Western Energy's proposed reclamation methods would be more likely to establish a diverse vegetation cover than previous methods employed at the mine. Diverse vegetation

would be better able to withstand the droughts which can be expected to recur in the northern Powder River basin. Owing to the relatively brief experience with modern reclamation, however, there is no complete assurance that mined areas with good initial revegetation will develop the necessary diversity or will be able to withstand normal land use and climatic patterns over many decades.

No impacts on rare or endangered plant species are expected because none are known to exist in or near the mine area.

Because Western Energy has not applied for "alternative reclamation" (82-4-233(7) MCA), the approximately 110 acres of wheat fields would not be reestablished.

G. WILDLIFE

Impacts on wildlife from the Area B extension would not be significant, because present wildlife use of the mine area is limited by existing mining disturbances at Area B and by the lack of topographic and vegetative diversity. Existing Hungarian partridge habitat would be lost, although suitable habitat is available in adjacent areas. Increased traffic associated with the mine may temporarily displace some species.

Successful reclamation and continued proper postmining management is essential to improving and reestablishing wildlife use of Area B following mining. Measures which would enhance revegetation success, and thus habitat for wildlife, are discussed in chapter IV, Technical Alternatives, Soils. Volume 1, chapter VIII of FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980) discusses possible long term monitoring and research programs to promote successful management of reclaimed land. FES 80-1 also discusses possible measures to mitigate wildlife impacts, such as attempting to reclaim trees and shrubs in densities similar to those existing before mining. With successful revegetation and sensitive postmining management, wildlife habitat on Area B would likely be improved over the less-than-optimum conditions that currently exist.

No rare, threatened, or endangered wildlife species are known to use the mine area; thus, none would be disturbed.

H. SOCIAL CONDITIONS

Approval of the Area B extension would not significantly affect population growth or social conditions in Rosebud County. Growth due to the mine would be completely overshadowed by growth due to construction of Colstrip generating units 3 and 4. The increment of growth due to Area B would add only slightly to the additional social stresses expected to result from the construction of units 3 and 4.

The population of Rosebud County is projected to increase by more than 40 percent over the next decade--from 9,850 in 1979 to 13,900 in 1990.

Area B would contribute between 140 and 200 persons--less than 1.5 percent--to the projected increase, most of which would be due to operation of Colstrip units 1-4, the Big Sky mine, and the remainder of the Rosebud mine.

The increment of growth from Area B alone would not cause rapid, stressful social change. Cumulative effects from construction of Colstrip units 3 and 4 and expansion of the Rosebud and Big Sky mines would be significant whether or not the Area B extension is approved. During the 2 or 3 years of most rapid growth, local governments, formal and informal institutions, and social networks in Colstrip and Forsyth would not be able to meet the demands placed on them (FES 80-1--U.S. Department of the Interior and Montana Department of State Lands, 1980).

If the Area B extension were approved and Colstrip units 3 and 4 were not built, existing social conditions identified in chapter II, Sociology would continue. Because the rate of growth would remain moderate, society would have time to adapt to the changes that have occurred. Local society would continue to reorganize to reflect the increasing presence of mining-related residents. Ranchers, who dominated the political and cultural life of the area before 1968, would continue to be an important, although less dominant part of local society. Cultural differences caused mainly by the influx of large numbers of newcomers would be less severe and would probably ease with time.

I. ECONOMICS

Rosebud County and the towns of Forsyth and Colstrip would not experience any significant adverse economic effects from the extension of the Area B mine. Employment at the mine would remain about the same, and ancillary (indirect) employment due to the mine would increase slowly. Revenues contributed by the mine and its employees would be commensurate with the increased costs of providing public services and facilities. The construction of generating units 3 and 4 at Colstrip would affect employment, income, and fiscal conditions in Rosebud County significantly more than the Area B extension.

The following documentation and explanation of economic effects is based on data from the COALTOWN computer model (Temple, 1978).

1. Employment and Income

The approximately 120 jobs attributable to the Area B mine would continue, representing about 6 percent of the total basic employment in Rosebud County by 1990--about the same as in 1979. From 1980 through about 1984, however, the contribution of Area B to basic employment in the county would become insignificant compared to the approximately 2,000 workers needed during the construction peak for generating units 3 and 4.

As part of the nationwide trend toward a greater number of ancillary jobs for each basic job, ancillary employment due to the Area B mine would increase slowly--from about 8 in 1979 to about 60 by 1990. New ancillary jobs would primarily be in the trades and services industries. The increase in ancillary employment due to Area B would be only about 2 percent of the total increase expected by 1990, most of which would be attributable to the construction and operation of generating units 3 and 4. Total ancillary employment in Rosebud County is expected to increase from about 2,700 jobs at present to about 4,900 jobs by 1990.

The average income of the mine workers would continue to be considerably higher than the average income of workers in other sectors. (See chapter II, Economics.)

2. Taxation

The taxable value of Area B and local property taxes paid by mine employees and other mine-related residents would be sufficient to pay for continued operation of the needed community services and facilities. Construction of generating units 3 and 4, however, would have the most substantial financial effect on Rosebud County; the taxable value of Area B would probably be less than 2 percent of the county total by 1990. From about 1980 to 1984, tax rates in the county and in Forsyth would have to be raised substantially above their current low levels to provide needed services and facilities to the Colstrip 3 and 4 construction workers and their families. Tax rates, however, would continue to be lower than in most other Montana cities and counties.

J. COMMUNITY SERVICES

Impacts on community services in Rosebud County from the Area B extension would not be significant, because the existing services and facilities in Forsyth and Colstrip would be sufficient to accomodate the minor population increases due to the mine. The cumulative impact of Colstrip generating units 3 and 4, and, to a lesser extent, the Rosebud and Big Sky mines, will be comparable to that experienced during the construction of generating units 1 and 2 from 1973 through 1977. The Area B extension, however, would contribute very little to this temporary overloading.

The following social services in Rosebud County would be significantly strained during construction of generating units 3 and 4 from 1981 through about 1984. Mental health services, including drug and alcohol counseling and treatment, crisis intervention, family counseling, and institutional screening, would be strained the most, mainly because those services are not fully supplied at present. Area B would contribute relatively little to the anticipated need for social services.

Physical facilities would not be significantly strained in either Forsyth or Colstrip. The planned expansion of schools and the sewer and

water system in Colstrip should be sufficient to handle the 80 percent of the generating units' construction force expected to locate there. About 20 percent of the construction workers would locate in Forsyth, but the improvements in Forsyth's water and sewer system made in response to generating units 1 and 2 should accomodate the expected population influx.

K. LAND USE

Mining at Area B would not significantly affect land use patterns or agricultural production in Rosebud County. Livestock grazing on the reclaimed minesite would not be significantly limited if proper range management techniques are used by any subsequent landowner.

Mining and reclamation would preclude normal livestock grazing on about 1,366 acres of Area B until 1990; the remaining reclamation would further preclude normal livestock grazing until about the year 2000. (See table III-3.) During the same 20 year period, the entire Rosebud mine, the Big Sky mine, and Colstrip generating units 1-4 would displace livestock grazing on about 24,000 acres--less than 1 percent of the available grazing land in Rosebud County. Although the majority of the displacement would be temporary, the construction and operation of Colstrip units 3 and 4 would result in about 890 acres being permanently devoted to urban and industrial uses, mostly in Colstrip but perhaps as many as 40 acres in Forsyth, where some of the workers would live. (FES 79-29--U.S. Department of the Interior, 1979). Area B would contribute negligibly to this additional urban and industrial land use because the number of people attributable to Area B would increase only slightly.

The Area B extension would mine 110 acres of cropland. All projected mining and power generation near Colstrip would consume about 800 acres of cropland--only 0.6 percent of the available acreage in Rosebud County.

Given adequate management, the postmining vegetative productivity on most of the reclaimed surface would not be significantly lower than the normal premining productivity. The reclaimed minesite would be more sensitive to mismanagement owing to the unavoidable alteration of soils. (See Soils.)

L. TRANSPORTATION

Impacts on transportation from the Area B extension would not be significant. Road traffic associated with the mine would not exceed present highway capacity. Rail capacity would not be affected because coal production at Area B would not be increased.

The average daily traffic on FAP 39 from Colstrip to Interstate I-94 would increase about 10 vehicles/day by 1983--slightly more than 1 percent above the 1978 average level of 678 vehicles/day. That increase

Table III-3.--Western Energy land use summary

[Data are in acres. Leaders (---) indicate data are not available]

	Premining		Condition 10/1/79		1990	
	Total	Area B (secs. 3, 4, 9, 10)	Total	Area B	Total	Area B
Undisturbed						
Crops	1,420	220	1,000	110	800[2]	0
Ponderosa pine	7,440	10	6,900	10	6,300	0
Rangeland	16,840	1,471	16,143	1,198	12,793	279
Subtotal	26,000	1,701	24,043	1,318	19,893	279
Disturbed						
Active mining, spoils, and highwall reduction area	0[1]	0	300	160	550	200
Facilities & haul roads	0	0	300	60	700	60
Associated disturbance	0	0	100	---[3]	1,000	---[3]
Reclamation	0	0	1,200	160	2,800	1,159
Subtotal	0	0	1,900	380	5,050	1,419
Bond Release						
Crops	0	0	0	0	0	0
Ponderosa pine	0	0	0	0	0	0
Rangeland	0	0	0	0	1,000[4]	0
County road	0	0	57	3	57	3
Subtotal	0	0	57	3	1,057	3
Total	26,000	1,701	26,000	1,701	26,000	1,701

[1]About 1,600 acres of unreclaimed spoils remain from the original Northern Pacific mine near but not formally part of the Western Energy mine.
[2]Preliminary estimate.
[3]Included in active mining.
[4]Assumes no problems in certifying reclamation success; may be overestimated.

would be insignificant relative to the additional 550 vehicles/day expected to result by 1983 from the construction of Colstrip units 3 and 4. Total traffic on FAP 39 would increase to an average of about 1,300 vehicles/day in 1983. The road's capacity would not be exceeded, however, because the Montana Department of Highways is improving the major highways in the area--FAP 39 and FAP 37.

Rail traffic on the Colstrip spur would increase over the 1970's level about 30 percent through the 1980's. This would not exceed capacity. Area B would not contribute to this increase.

M. RECREATION

Mining would not significantly impact recreation in the mine area, because no developed recreation facilities exist, and because the land is not generally used by the public--only occasionally by hunters and snowmobilers. The mine, however, would contribute slightly to overloading an already strained carrying capacity for recreation facilities in the Colstrip area. Future population increases between 1980 and 1984, associated with the construction of generating units 3 and 4, would considerably reduce recreation enjoyment of long term residents and visitors. Residents would be aware of increased crowding and litter at and near developed outdoor recreation facilities. The facilities proposed for construction in Colstrip, mentioned in chapter II, would not adequately mitigate this problem.

N. CULTURAL RESOURCES

Impacts on cultural resources from the Area B expansion would not be significant because none of the area's known archaeological and historical sites appear to be eligible for nomination to the National Register of Historic Places. (See chapter II, Cultural Resources.) Mining would consume the area's three archaeological sites. Blasting from mining may slightly increase the rate at which the structures on the one historical site would deteriorate.

O. ESTHETICS

Long term esthetic impacts would not be significant because the topography and vegetation on the reclaimed mine would not seriously contrast with the surrounding unmined land. The moderately diverse topography in Area B would be replaced by a smoother reclaimed surface with a less natural appearance, but the landforms that would be lost are not unusual for the Colstrip area or the northern Powder River coal basin.

During the next decade, mining would continue the sights and sounds described in chapter II, Esthetics. Those impacts, however, are not

significant because of the prevalence of similar sights and sounds from the mines and generating units near Colstrip. One or possibly two draglines would be moved into Area B and would be visible from nearby roads. When mining is completed, industrial sounds would be less obvious in the area and the spoil piles and dragline(s) would no longer be present.

Following mining, the small buttes and ridges in Area B would be replaced with a gently rolling surface, reducing topographic diversity and esthetic appeal. Maximum slopes would be about 10 percent. Most of the bluffs south of the mine--the most distinctive part of the area--would not be disturbed.

Initial revegetation on the reclaimed surface would likely be more attractive than the existing vegetation, which has been heavily grazed. Over the long term, successfully reclaimed vegetation would not be easily distinguishable from surrounding unmined land.

CHAPTER IV

ALTERNATIVES TO APPROVING THE PERMIT AS PROPOSED

This chapter considers alternatives to approval of Western Energy Company's proposed mine plan. The administrative alternatives available to the Department of State Lands include denial of the permit, selective denial of portions of the permit, and approval of the permit subject to stipulations. Possible stipulations which would reduce the environmental impacts identified in chapter III are discussed as technical alternatives. Any of those alternatives could be chosen if necessary to reduce the environmental impacts of the proposed mining or to comply with legal requirements and the lease terms. This chapter also considers the environmental impacts if Western Energy were to extend its mine into sections 7, 8, 17, and 18 of T. 1 N., R. 41 E.

A. ADMINISTRATIVE ALTERNATIVES

1. Department of State Lands

Other than the decisions to approve or disapprove a permit, only two alternatives are available to the Department: (1) approval of the permit with modification; and (2) selective denial of the permit to mine in a specified area that includes lands having special, exceptional, critical, or unique characteristics, or where mining would affect the use, enjoyment, or fundamental character of neighboring land having the above special characteristics. Either or both of these alternatives could be invoked after the permit application was deemed complete, under the provisions of 82-4-227 MCA.

If no action were taken by the Department within 240 days after receipt of a complete application for a mining and reclamation permit, the permit would be statutorily approved by default.

Montana also does not have a formal administrative alternative to "defer action" following the receipt of a completed application for a mine and reclamation permit.

The Department may reject a proposed plan that does not meet the applicable laws and regulations under its authority. If Western Energy's current permit application were denied, and no further permits were issued for Area B, the company would have to end its Area B operations in the second quarter of 1980. This is evaluated as the "no permit-no replacement" and "no permit with replacement" scenarios in this chapter.

Western Energy would undoubtedly propose an alternative mine plan within Area B if the current permit application were denied. The impacts of such a revised plan cannot be determined at this time.

Until a revised mine plan were submitted and approved, Area B would continue in its present condition, subject to modification by natural processes and by the continuation of other existing activity and uses, and to further modification by the surface owner to meet other uses.

2. Department of Health and Environmental Sciences

The Air Quality Bureau of the Department of Health and Environmental Sciences is requiring a permit application from Western Energy (Michael Roach, Air Quality Bureau, written commun., 1979.) The Air Quality Bureau has a staff person assigned to the Department of State Lands to help review permit applications and ensure coordination between the agencies.

B. PRODUCTION LEVEL ALTERNATIVES

1. Low Production Level

There are two parts to the low production scenario: no area B permit with no replacement of coal production from other areas of the Rosebud mine; and no Area B permit with replacement from elsewhere at the Rosebud mine.

a. No Area B permit and no replacement

Coal production from Area B would cease after 1980 because Western Energy would run out of coal in its existing permit area in section 3. This would reduce the production for the entire Rosebud mine to about 14 millions tons/year by 1985.

Summary of impacts

Area B would not be disturbed and its current (but relatively low) grazing, wildlife, and recreation potential would be preserved. Soil and water resources would be undisturbed.

Impacts on air quality would be decreased only slightly--probably within the range of measurement variability.

Employment in Rosebud County over the next 10 years would grow slightly less than if the extension were approved. A hundred jobs would be lost in the basic sector and about 60 in the ancillary sector. Both sectors, however, would continue to grow because of other coal-related activities. The impacts on income would be minimal.

Traffic on FAP 39 and FAP 37 would be about 1 percent less than the level described in chapter III. The three archaelogical sites identified in chapter II would not be destroyed.

The existing spoils piles would be regraded and revegetation of mined areas completed 11 years sooner than under the company's proposal. Mining would be limited to areas of low relief.

b. No Area B permit with replacement elsewhere

Under this scenario the shortfall from Area B would be replaced by increased production elsewhere from the Rosebud mine (Areas A or E at

first, or possibly Area C after 1983, and Area D after 1984). Overall production from the Rosebud mine would remain the same.

Summary of impacts

Impacts would be about the same for the no permit/replacement elsewhere scenario as they would for the no permit/no replacement scenario.

Mining in Area D may cause a minimal effect on ground water flow, while mining in Area C may induce significant net inflow from ground water storage (Van Voast and others, 1977). Depending upon actual layouts, locations, methods of mining, postmining ground water flow within the alluvium of East Fork Armells Creek could be reduced. Ground water impacts from mining in Areas A and E would be negligible, primarily because the Rosebud coal seam in these areas contains little water.

Cultural resources inventories and mitigation measures are required for all proposed mine areas, so important cultural resources in other areas would be preserved or inventoried.

Esthetic impacts would perhaps be slightly greater than under the company's proposed plan, because parts of the Rosebud mine have slightly more visual diversity--in the form of buttes, ridges, and sandstone and scoria outcrops.

2. High Production Level

Under this scenario, Western Energy would add an overburden stripping shovel and increase its production from Area B by about 3 millions tons/year (mty). Production would reach a high of 7 mty in 1982 and would fall to 4.8 mty in 1984.

By adding sections 7, 8, 17, and 18, the company would be able to mine longer box cuts. These cuts would be oriented in the same direction as those in section 4, parallel to the general trend of East Fork Armells Creek. Western Energy controls the coal lease on all these sections, except the SE 1/4 of section 8, for which it is negotiating with the Bureau of Land Management. Overall production at the Rosebud mine would not increase over that of the company's proposal or the no permit/replacement elsewhere scenario. With increased production in Area B, other areas of the Rosebud mine would produce at lower levels, thus increasing the overall life of the Rosebud mine, though not the life of Area B.

Summary of impacts

Surface hydrologic and geomorphic impacts would be proportionately greater than under the proposed plan if similar mining methods and reclamation techniques are used. At least two wells would also be removed. Ground water impacts would be considerably greater, owing primarily to the increased diversion of flow from the East Fork Armells Creek alluvium toward a much longer active pit. Consequently, there would be a greater

linear interruption of flow within the stream. Postmining conditions would likely be similar to those of premining, except that the spoils would require much more time to resaturate. Ground water quality within the spoils and adjacent and downstream alluvium would be considerably degraded.

No known cultural resources of importance would likely be disturbed in sections 7, 8, 17, and 18 (Fredlund, 1978). The Advisory Council on Historic Preservation (National Register of Historic Places), in consultation with OSM and the Montana Historic Preservation Office, has not yet determined the eligibility of sites found in these sections.

Impacts on esthetics would be more extensive and would last about 2 decades instead of 1. The long term effect would differ little from the company's proposal, because the additional area mined contains no unusual or esthetically distinctive features.

C. TECHNICAL ALTERNATIVES

1. Alternative Mining Methods

Western Energy could align its mining cuts perpendicular to the slope contour instead of with the contour as currently proposed. If the cuts ran perpendicular to the contour (approximately north-south), spoils could be replaced at about the same elevation as they were mined. This would make it easier to fill in the final boxcut. This method, however, is not economical for a dragline operation such as Area B because the dragline would have difficulty climbing and operating on the upper slopes of Area B. This method may be feasible for other mines using trucks and shovels to remove the overburden.

Western Energy could be required to mine the McKay coal seam which underlies the Rosebud seam. The company has not found a suitable market for the McKay coal due to the coal's tendency to slag at normal boiler operating temperatures. The possibility exists that the company could find a buyer for McKay coal or blended Rosebud-McKay coal. Mining both the Rosebud and McKay seams would recover about one-third more coal per acre disturbed than mining the Rosebud seam alone.

Other alternative ways to mine coal from Area B do not appear to be practical. The following discussion is summarized from the Department's previous EIS on the Area B mine (Montana Department of State Lands, 1976).

Underground mining would not directly disturb the soil and stratigraphy overlying the coal, but the land surface would subside. The resulting subsidence depressions and holes would restrict the use of the land for livestock grazing. Coal fires are a hazard at abandoned underground mines; a coal fire has been burning at the Monarch mine in Sheridan County, Wyo., for years. Underground mining recovers considerably less coal than strip mining; the most efficient underground techniques (which

would probably require more stable roof conditions than exist at Area B) recover about 80 percent of the coal, compared to 90 percent with strip mining.

Auger mining could possibly be used in conjunction with strip mining methods to recover coal a few hundred feet beyond the present economic limit of overburden removal. The holes left by auger mining could not be refilled and would lead to surface subsidence. Coal recovery would be less than 50 percent; the unmined coal could not be recovered by strip mining in the future.

Removal of the coal in solution or as a gas (in situ mining) is theoretically possible, but proven technology does not now exist.

2. Alternative Energy Sources

Mining at Area B is predicated on continued demand for coal. It does not appear likely that other sources of energy will soon replace Western Energy's current market for Area B coal.

Other fossil fuels such as natural gas and oil are in short supply. Conversion of coal-fired boilers to oil or gas is discouraged under Federal policy. Electric generation from nuclear power has not increased as fast as once predicted because of high capital costs and concern over safety. New sites for hydroelectric generation are limited. Solar power (including direct conversion, wind energy, and biomass utilization) is not likely to replace many existing coal fired generation facilities in the near future.

A nationwide program of energy conservation could significantly slow the rate of growth of electric energy use, but conservation would not likely make existing generating facilities obsolete in the next 10 years.

3. Additional Mitigating Measures

The following measures would mitigate the environmental impacts predicted in chapter III.

a. Hydrology

The Department of State Lands could require Western Energy to monitor ground water and surface water discharges for quality and quantity from Area B and at points along East Fork Armells Creek to determine the relative contribution of Area B to changes in the flow of East Fork. This would help determine whether Area B is contributing to the observed waterlogging problem in hay fields downstream from Colstrip or to the suspected decrease in flood flows and water quality of East Fork. If it were, the Department could require corrective action.

The Department could require Western Energy to line a trench located between East Fork Armells Creek gravels and the initial box cut with an

impermeable material such as clay or plastic. This would reduce inflow of ground water from the alluvial gravels of East Fork Armells Creek, thereby minimizing disruption of the hydrologic system of East Fork. Water flowing into the box cut could make it difficult to form a stable, impermeable barrier, however. Alternatively, the Department could require Western Energy to move its proposed box cut further away from the stream so that it intercepted less alluvium. This would reduce the coal that could be mined from Area B by 209,000 tons--less than 1 percent of the total to be mined.

Western Energy has proposed to release runoff in excess of sediment storage volume from Area B sedimentation ponds--an improvement over the original proposal to retain all runoff. Disruption of the normal runoff pattern of East Fork Armells Creek would be further minimized if the company were to release all impounded runoff as soon as the sediment settles out and it meets water quality requirements. This would eliminate a source of water to control dust on haul roads and haul ramps, however. Western Energy could obtain replacement water from effluent from the Colstrip municipal sewage treatment plant or from ground water.

b. Soils

The Department could require Western Energy to selectively mix soils which are temporarily placed in soil stockpiles. The Department requires the direct placement of soils wherever possible, but it also recognizes that a considerable percentage of the topsoil material will be stored. In the process of storing soils, contrasting textured soils could be placed in alternate layers. When these soils are eventually picked up for placement on spoils, the operator could pick up the soils across the layers, affording a considerable degree of mixing. Western Energy Company has stated that this alternative is not practical at Area B.

c. Air quality

Western Energy could initiate a monitoring program to obtain more accurate information on the contribution to particulate emissions from coal handling facilities, the coal storage pile, and open coal cars. The program would help determine whether the coal storage piles should be enclosed and whether coal shipped by unit train should be treated with hot oil.

Coal dust emissions from the handling facilities at Area A could be reduced 99 percent by fully covering all conveyors and transfer points, ducting emissions to a central baghouse. (U.S. Environmental Protection Agency, 1979). The baghouse could possibly be used in conjunction with a negative pressure truck dump, decreasing emissions there by 85 percent. Dust suppression measures proposed by the company are described in table II-5.

Western Energy could prevent the loss of up to 1 percent of the coal from unit trains by treating the coal with hot oil. This procedure is in use at the Decker mines in Big Horn County.

d. Transportation

Commuter traffic from mining at Colstrip could be decreased by introducing car pooling or bus service between Forsyth and Colstrip, and by establishing more temporary and permanent housing at Colstrip. These alternatives would help reduce traffic on the highways connecting the Rosebud mines and outside communities.

Increasing the number of cars in each unit train (from the current 100-120 to 160-180) could slightly reduce resulting air pollution; the the increased emissions from each train's locomotives would probably be more than compensated by the reduced frequency of trains. Extra long trains might not be feasible due to increased wear on track, engines, and cars.

CHAPTER V

CONSULTATION AND COORDINATION

A. DEVELOPMENT OF THIS STATEMENT

Information used to analyze Western Energy Company's proposed permit amendment for Area B was solicited from the following agencies and companies:

Federal Agencies:

Advisory Council on Historic Preservation, Washington, D.C.
Department of Commerce:
  National Oceanic and Atmospheric Administration, Great Falls, Montana
U.S. Department of the Interior:
  Geological Survey, Denver, Colorado
  Mine Safety and Health Administration, Arlington, Virginia
  Office of Surface Mining, Denver, Colorado

State Agencies:

Department of Community Affairs
Department of Health and Environmental Sciences:
  Air Quality Bureau
Department of Highways
Department of Fish, Wildlife, and Parks
Montana Historical Society:
  Historic Preservation Office
Montana State University:
  Mine Reclamation Research

Companies:

Ecological Consulting Service
Hydrometrics
Montana Power Company
Western Energy Company

The following individuals contributed to the preparation of this final environmental impact statement. The services of David Stiller were obtained under contract; other contributors are Department of State Lands personnel. See also the list of contributors to the Draft EIS in chapter V of that document.

Coefield, Thomas, Economist
  - B.S. Economics, University of Montana, 1970

Cornelius, Diana, Sociologist
  - B.A. Economics/Sociology, University of Montana, 1979

Fuller, Beverly, Office Manager

Contributors (continued):

Harrison, Kay, Office Manager
- Business & Administrative studies, Montana State University, Bozeman

Herrin, John, Hydrologist
- B.S. Earth Science, California State University, Long Beach, 1974
- B.S. Geology, Northern Arizona University, 1976

Howard, Craig, Vegetation Analyst
- B.S. Wildlife, Montana State University, 1974
- M.S. Botany, Montana State University, 1976

Johnson, Sandra, Coordinator
- B.A. Biology, Mount Holyoke College, 1973
- M.S. Candidate, Botany, University of Montana, 1977

Olsen, Bill, Air Quality Specialist
- B.A. Biology, State University College of New York, 1971
- Ph.D. Candidate, Botany, University of Montana, 1977

Spano, Scott, Soil Scientist
- B.S. Forestry, Michigan Technological University, 1976
- M.S. Forest Soils, Michigan Technological University, 1978

Spinney, Robert, Asst. Environmental Coordinator
- B.S. Fish and Wildlife Management, Montana State University, 1974
- M.S. Fish and Wildlife Management, Montana State University, 1976

Stiller, David, Hydrologist
- B.S. Geography, University of Wyoming, 1972
- M.A. Physical Geography-Geology, University of Wyoming, 1975
- Ph.D. Candidate, Physical Geography, University of Calgary, 1979

Swain, Walter, Soils Specialist
- B.A. Geography, Beloit College, 1967
- M.S. Forest Soils, University of Washington, 1975

Swanson, Fred, Editor
- B.A. Psychology, University of Oregon, 1973
- M.S. Environmental Studies, University of Montana, 1976

Wilson, Michael, Team Leader
- B.A. Economics, California State University (Chico), 1977

The Department appreciates the assistance of Mike Shea, permit coordinator for Western Energy Company, who provided the EIS team with information and arranged visits to the minesite.

B. REVIEW OF THIS STATEMENT

A preliminary version of this EIS was reviewed by the Department of State Land's Reclamation Division, the Department's Environmental Administrator, and the Commissioner of State Lands.

In accordance with the Department's regulations governing environmental impact statements (EIS's), copies of the draft EIS were made available to the public for comments and suggestions. All comments received were carefully considered in the preparation of this final EIS.

The draft and final statements are available for review in the following places:

- Montana Department of State Lands, 1625 11th Avenue, Helena, Montana
- Big Horn County Public Library, 419 North Custer Ave., Hardin, Mont.
- Miles City Public Library, 1 South 10th, Miles City, Mont.
- The Rosebud County Library, 201 North 9th Ave., Forsyth, Mont.
- Parmley Billings Public Library, 510 North Broadway, Billings, Mont.
- Sheridan County Fulmer Public Library, 320 North Brooks, Sheridan, Wyoming.

A limited number of copies of the draft and final statements are available on request from the Department of State Lands, Capitol Station, Helena, MT 59620.

C. COMMENTS and RESPONSES

Written comments received from individuals, organizations, and government agencies are reproduced on the following pages along with the Department's response. Each letter is identified with a letter; each comment requiring a response is identified with a number.

Copies of all comments were sent to Western Energy Company as required by the Department's regulations implementing the Montana Environmental Policy Act. Western Energy did not respond to those comments.

Advisory Council On Historic Preservation

1522 K Street N.W.
Washington D.C.
20005

ADVISORY COUNCIL ON HISTORIC PRESERVATION
LAKE PLAZA-SOUTH
SUITE 616
44 UNION BLVD.
LAKEWOOD, COLORADO 80228

March 11, 1980

Mr. Leo Berry, Jr.
Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, Montana 59601

Dear Mr. Berry:

1 This is in response to your request of February 8, 1980, for comments on the draft environmental statement (DES) for the proposed Western Energy Company's Rosebud Mine Area B Extension near Colstrip, Montana.

The Council has reviewed the DES and notes that while cultural resource studies to date indicate that no properties included in or eligible for inclusion in the National Register of Historic Places will be affected by the proposed undertaking, additional cultural resource studies will be undertaken prior to project implementation. The Council also notes that the State and Western Energy Company recognize their responsibility to consult with the Montana State Historic Preservation Officer and the Office of Surface Mining to fulfill responsibilities pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) should the above-cited cultural resource studies identify previously unknown significant properties.

Should you have questions or require assistance, please contact Brit Allan Storey of the Council staff at (303) 234-4946.

Sincerely,

Louis S. Wall
Chief, Western Division
of Project Review

1 Western Energy Company has completed the requested additional cultural resource inventories and has sent a copy to the Department of State Lands and the U.S. Office of Surface Mining (Michael Shea, Western Energy Company, oral commun., April 11, 1980). The Department has sent the information to the State Historic Preservation Office. The additional survey work did not identify any significant new historical or archeological sites (see chapter II, Cultural Resources). See also letter N from the Montana Historical Society.

DEPARTMENT OF THE ARMY
OMAHA DISTRICT CORPS OF ENGINEERS
6014 U S POST OFFICE AND COURTHOUSE
OMAHA NEBRASKA 68102

REPLY TO
ATTENTION OF

MROPD-A

27 February 1980

Mr. Leo Berry, Jr., Commissioner
Department of State Lands
State of Montana
1625 Eleventh Avenue
Helena, MT 59601

Dear Mr. Berry:

We are responding to your letter of 8 February 1980 referring to the Draft Environmental Impact Statement concerned with Area B of the Rosebud Mine, Colstrip, Montana.

Based on the information submitted, Area B is located south of East Fork Armells Creek and is drained by five short northward-flowing ephemeral drainages. The referenced Creek and the five drainages flow at an average annual rate of less than 5 cubic feet per second. Accordingly, for the purpose of Section 404 of the Clean Water Act, the proposed activity is authorized under the Nationwide permit without further processing provided the following conditions are adhered to:

1 a. That the fill will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

b. That the fill will consist of suitable material free from toxic pollutants in other than trace quantities.

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

d. That the fill will not occur in a component of the National Wild and Scenic River System or in a component of a State Wild and Scenic River System.

In addition to the conditions specified above, the following management practices should be followed to the maximum extent practicable in the performance of the work:

a. Fills in spawning areas during spawning seasons should be avoided.

1 Thank you for explaining your permit procedures. A copy of your letter has been sent to Western Energy Company. It will be their responsibility to apply for a Section 404 permit if one is necessary. It does not appear, however, that any of the listed conditions or management practices would be violated; therefore, a section 404 permit may not be required.

MROPD-A 27 February 1980
Mr. Leo Berry, Jr.

b. If the fill creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow should be minimized.

c. Fills in wetlands areas should be avoided.

d. Heavy equipment working in wetlands should be placed on mats.

e. Fills into breeding and nesting areas for migratory waterfowl should be avoided.

f. All temporary fills should be removed in their entirety.

g. Discharges of dredged or fill material into waters of the United States should be avoided or minimized through the use of other practical alternatives.

We would emphasize that the above determination does not obviate the requirement to obtain State or local assent as required by law.

If you have any questions, please contact the Corps of Engineers, Omaha District, address as noted at beginning of letter.

Sincerely,

JOHN E. VELEHRADSKY
Chief, Planning Division

UNITED STATES GOVERNMENT

memorandum

DATE: February 28, 1980

REPLY TO ATTN OF: District Manager, BLM, Miles City, Montana 1792

SUBJECT: DEIS Review of Area B, Western Energy's Rosebud Mine

TO: Bruce Hayden, Admin., Reclamation Division
Department of State Lands

We appreciate this opportunity to comment on your Draft EIS for WECO's Area B. A review by members of our staff has shown this document to be generally well written and fairly accurate.

The following are our specific comments pertaining to the Draft EIS.

1 1) In Table II-5 (pg. II-12) you are discussing measures that are "to be implemented", however, some of the dates shown indicate that these projects should have already taken place. If they have not, the table should be updated to reflect the changes.

2 2) Social Economics (pg. II-17) - For a description of the existing environment there is entirely too much space devoted to the history of the area. Based on your statement in Social Conditions (pg. III-11) that there are no significant affects, the first paragraphs in both sections would be adequate. The additional verbage serves no real function other than to extend the sections.

3 3) Air Quality (pg. III-5) - It appears that a great deal of explanation has been added to this section to express a finding of "contribute slightly" to the present condition. This section reads as if the writer was not convinced that there would only be a slight increase, and was trying to convince the reader otherwise. The first paragraph should be sufficient to state the impact.

Again, thank you for this opportunity to comment.

Robert A Tompkins

Acting

1 The date for reclamation of the borrow area in table II-5 should have been fall 1979. The draft EIS was written in the fall of 1979, so at that time many of the proposed fall 1979 dust control measures were not completed.

2 The brief historical discussion provides a perspective on Western Energy's mining operations. The discussion shows which impacts have occurred to date from mining at Colstrip, in contrast to impacts expected as a result of continued mining.

3 The first paragraph of chapter III, Air Quality summarizes impacts on air quality; it points out that Area B would contribute a small portion of the total air pollutants in the Colstrip area. The ensuing text further explains both the relatively small increment of pollution due to Area B and the overall cumulative impacts in the Colstrip area.

LETTER D

United States Department of the Interior
BUREAU OF MINES
EAST 315 MONTGOMERY AVENUE
SPOKANE, WASHINGTON 99207

February 28, 1980

Mr. Leo Berry, Jr.,
Commissioner
Dept. of State Lands
1625 Eleventh Ave.
Helena, MT 59601

Dear Mr. Berry:

1 We have reviewed the draft environmental statement for Western Energy Company's Rosebud mine, Area B Extension, Rosebud County, Montana. Development of the Area B Extension should have no adverse impacts on the minerals sector of the economy. On the contrary, implementation of this project and the resulting electricity produced would be beneficial. We have no suggestions to improve the statement.

Sincerely,

for B. N. Appling, Jr., Chief
Western Field Operations Center

1 Thank you for your comments.

LETTER E

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Billings Area Office
Federal Building, Room 3035
316 North 26th Street
Billings, Montana 59101

IN REPLY REFER TO: ES

March 13, 1980

Mr. Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59601

Dear Mr. Berry:

We have reviewed the draft environmental impact statement on Area B of Western Energy Company's Rosebud mine near Colstrip, Montana. We believe the statement adequately addresses impacts occurring to fish and wildlife resources.

1 We note that in this expansion, as in previous expansions for the Rosebud mine, that Western Energy does not plan to mine the McKay coal seam. The stated rationale for this position is that the coal is not marketable because of the coal's tendency to slag at normal boiler operating temperatures. We are aware, however, that other mining companies in the Colstrip area have mined and marketed the McKay as well as the Rosebud seam. In order to prevent the waste of this non-renewable resource, it should be recovered as the Posebud mine is extended into Area B. Removing all recoverable coal under current technologies will result ultimately, in less surface disturbance with subsequent reductions in impacts to wildlife resources.

2 We also note that the proposed reclamation plan would result in small buttes and ridges in Area B being replaced with a gently rolling surface, with reduced topographic diversity. The alternative method of highwall reduction would leave some sandstone ledges and small cliffs which to some extent would mitigate the loss of small buttes and ridges. The alternative method of highwall reduction should be encouraged.

Thank you for the opportunity to review and comment on this draft environmental impact statement.

Sincerely,

Wally Steucke
Area Manager

1 Recovering the McKay coal seam would reduce surface impacts for a given rate of mining. The Peabody Coal Company's use of the McKay coal does not necessarily mean that Western Energy Company could market the coal.

2 The alternative highwall reduction method described in chapter IV of the DEIS would not work very well at Area B because the sandstone is not very solid or erosion resistant. The proposed mitigation measure has been deleted from chapter IV of the FEIS. Western Energy has agreed to reconstruct complex slopes on the reclaimed minesite, which would retain more of the original topographic diversity. Complex slopes would not replace the lost microhabitats, however.

LETTER E

cc: Regional Director, USFWS, Denver, CO (ENV)
ATTN.: Frank Cole
Robert Martinka, Montana Department of Fish, Wildlife, & Parks,
Helena, MT
Regional Director, Office of Surface Mining, Reclamation, &
Enforcement, Denver, CO
ATTN.: Shirley Lindsay

LETTER F

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
Federal Building, Drawer 10076
301 South Park Avenue
Helena, Montana 59601

February 29, 1980

Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, Montana 59601

Dear Mr. Berry:

We have reviewed the draft Environmental Impact Statement for the Western Energy Company's Rosebud Mine Area B Extension. Our review was limited to the hydrologic considerations addressed in the report.

1 Page II-3, paragraph 3..."Western Energy has applied...for discharge permits."

The implication of this statement is that Western Energy desires to release natural runoff stored in sedimentation ponds into East Fork Armells Creek...assumably a logical request which would have no serious consequences. This may or may not be true. For example, if the sedimentation ponds are used to store water pumped from the mine pit the discharge could greatly exceed natural runoff. In addition, if the discharge rate and duration were different than natural runoff conditions, serious hydrologic problems might result. Under natural conditions, runoff occurs as high flows in the spring with virtually zero flow for the remainder of the year. This cyclic pattern allows water levels to fluctuate in the alluvial aquifers of the East Fork Armells Creek valley. A constant trickle of water could result in attenuation of water-level fluctuations and further compound water logging problems reported downstream from Colstrip.

Any discharge permit issued should require that inflow to the sedimentation ponds be identified and quantified and a schedule of discharge be established to minimize changes in the hydrologic regime.

2 The statement that "Total inflow...is lost to infiltration and evaporation..." could be interpreted to mean that the mine has zero discharge. While it may be true that no surface discharge occurs, the infiltration is a discharge that eventually arrives at East Fork Armells Creek albeit delayed. Although the MDHES, WQB does not require a permit for disposal via infiltration, this is an avenue of disposal as surely as overland flow.

1 The hydrologic analysis has been revised in response to these and other comments (see revised text, chapter III, Hydrology). The Montana Department of Health and Environmental Sciences has issued discharge permits to Western Energy for 26 points at the Rosebud mine, including Area B. The permits only require the company to monitor the quantity and quality of any discharges from the ponds, not inflow to the sedimentation ponds.

2 Some of the impounded water would reach East Fork Armells Creek. A revised discussion of this problem is presented in Chapter III, Hydrology, Surface Water.

Currently Western Energy does not release water from the sedimentation ponds unless they fill up. The ponds are designed to hold a 10-year, 24-hour flood. The company has agreed to release all impounded water within 15 days, except for a minimum volume to be used for watering haul roads. In an average year, that minimum storage volume would probably contain all runoff so that none would be released.

Page 2

3 Page II-6, paragraph 1-reference to figure II-2.
Figure II-2 is an extremely poor copy of VanVoast's piezometric map of the Rosebud aquifer. The draftsman who copied the piezometric contours obviously had no familiarity with ground water hydrology and, in numerous places, confused geologic contacts with piezometric contours. The resulting map is not too helpful to a reader trying to understand the groundwater hydrology of the area. I recommend the map be redrawn correctly or deleted entirely.

3 The piezometric contours were drafted incorrectly in a few places such as along East Fork Armells Creek, but the general direction of ground water flow indicated by the arrows is correct. The illustration has been deleted from the FEIS.

4 Page II-6, paragraph 5.
The statement that "No mine directly discharges water into East Fork Armells Creek; thus, Area B is not likely contributing to the problem of waterlogging" is a rather strong statement considering the lack of data needed to understand the waterlogging problem and its causes. As stated above, direct discharge is not necessary for the operation to contribute to hydrologic problems. In fact, slow drainage through infiltration could be more troublesome than direct discharge. "...losses by seepage...have been corrected..." evidently refers to remedial action taken at the surge pond to reduce underflow. This has little bearing on infiltration from holding ponds or sedimentation basins to be used in the new areas. The statement seems a little strong unless someone has closely monitored inflow and outflow from the ponds. To my knowledge, no one has attempted to quantify accurately the water balance in the sedimentation ponds.

4 The revised text in chapter III, Hydrology explains why Area B would probably contribute only slightly to the waterlogging problem downstream. More detailed work would be needed to confirm the source of the waterlogging problem. Available evidence indicates that the sources identified in the section on ground water in chapter II, Hydrology are the most likely contributors to the problem.

5 Page II-6, paragraph 6.
"The most likely causes..." probably should read.."Other causes". Without a total evaluation of the problem with extremely expensive data collection networks and digital models, I doubt that anyone could determine conclusively which causes were "most likely".

5 The factors listed in the DEIS are believed most likely based on available information. Additional study would better define the sources.

6 Page III-1, paragraph 5.
"Sediment eroded from the reduced highwalls would probably take years to degrade water quality in East Fork Armells Creek" is unclear to me. One extreme hydrologic event could flush a considerable amount of sediment into the creek. I fail to see why it would "take years" for this to happen. A high concentration of suspended sediment in a 100-year flood could deposit sediment over much of the valley floor and thus degrade flows for many years thereafter.

6 A severe storm would indeed transport suspended sediment from the regraded highwall directly into East Fork Armells Creek, but all of the bedload sediment would be trapped in the sedimentation ponds. Sediment levels in East Fork Armells Creek would therefore be slightly lower than at present as long as the sedimentation ponds are in place. Some stored sediment along the ephemeral drainages could be flushed into East Fork once the ponds are removed, but this could take years depending on the size and frequency of storms.

7 Page III-3, paragraph 3.
"...stratigraphic relations...would be reversed." should read "hydrologic relationship". Mining cannot reverse the stratigraphic relationship.

7 Noted. The paragraph has been revised in response to other comments.

8 Page III-3, paragraph 5.
The statement that "Area B extension would not worsen the problem of waterlogging...because mining would not increase the amount of ground water ultimately discharging into...East Fork Armells Creek." is not necessarily true. Sedimentation ponds may capture a large quantity of spring runoff and release it throughout the year as ground water flow. Sedimentation pond infiltration could increase the base flow of East Fork Armells Creek and compound downstream waterlogging problems.

8 See revised text, chapter III, Hydrology, ground water section. Western Energy has agreed to release most of the captured runoff within 15 days of the event and thereby avoid some of the slow infiltration from the ponds.

9 Page III-4, paragraph 3.
Apparently the authors interpret "sediment load" to be the bed-load component. It may indeed require..."years before...sediment (bedload)... become apparent..". However, suspended sediment would be transmitted to East Fork Armells Creek during the first runoff event that was not retained in a sediment pond. The fact that the tributaries are ephemeral has no bearing on the sediment load the stream would carry during an extreme flood.

I hope these comments are helpful to you in preparing the final EIS. If we can be of further assistance, please call.

Sincerely,

Joe A. Moreland
Chief, Investigations and Reports Section

cc: Mike Whittington, BLM
Mike Bishop, OSM
Wayne VanVoast, MBMG

9 Noted.

United States Department of the Interior
HERITAGE CONSERVATION AND RECREATION SERVICE
MID-CONTINENT REGION
POST OFFICE BOX 25387
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY REFER TO
DECR-80/6

MAR 7 1980

Mr. Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, Montana 59601

Dear Mr. Berry:

This is in response to your February 8, 1980, request for our review and comments on the draft environmental impact statement on Area B of Western Energy Company's Rosebud mine near Colstrip, Rosebud County, Montana.

1 The draft notes the locations of two archeological and one historic site and states that "none of these sites will probably qualify for nomination to the National Register of Historic Places." We suggest that information on these sites and the survey results be submitted to the State Historic Preservation Officer (SHPO) for evaluation and the SHPO opinion and recommendations be included in the final statement.

Sincerely,

Robert J. Arkins

Robert J. Arkins
Assistant Regional Director
Land Use Coordination

1 The additional survey work has been submitted to the State Historic Preservation Officer. The sites are not eligible for the National Register of Historic Places. See letter N from the SHPO and revised text, chapter II, Cultural Resources.

United States Department of the Interior
WATER AND POWER RESOURCES SERVICE
~~BUREAU OF RECLAMATION~~
Upper Missouri Region
P.O. Box 2553
Billings, Montana 59103

IN REPLY
REFER TO: UM-150

MAR 7 1980

Mr. Leo Berry, Commissioner
Montana Department of State Lands
1625 Eleventh Avenue
Helena, MT 59601

Dear Mr. Berry:

Thank you for the opportunity to comment on your Draft Environmental Impact Statement - Western Energy Company's Rosebud Mine Area B Extension.

We offer the following suggestions for improving the statement and reclamation efforts:

1 Page IV-6, Paragraph 2, third sentence states that:

> Preliminary results from field trials in the semiarid west indicate that 30 inches of soil material placed on regraded topsoil significantly aids successful revegetation.

2 The word topsoil should be replaced with spoils. Including a reference as to who is conducting these field trials would aid in substantiating the statement.

Page IV-6, Paragraph 3, third sentence states that:

> Since the primary chemical limiting factor to salvage is excess salts, lab analyses could be limited to electrical conductivity, a relatively simple and inexpensive procedure.

Other laboratory analyses which are very necessary to help determine the suitability of soils for revegetation include: SAR or ESP, particle-size analysis, disturbed hydraulic conductivity, moisture retention, and pH.

3 Page IV-6, Paragraph 4. Selective mixing of stockpiled soils prior to their redistribution over regraded spoils would appear to be a viable alternative. By mixing soils of contrasting textures; i.e., Busby series with the Unnamed series, a medium-textured soil would be the probable result. Desirable properties of the newly-produced soil may

1 Correction noted; however, the text in question has been deleted because Western Energy has agreed to maximize soil salvage. The field trials were conducted by the Northern Great Plains Research Center at Mandan, North Dakota (unpublished data).

2 Full analyses of two profiles for each soil series show that excess salinity is the primary limiting factor to soil salvage. Testing for the additional parameters is useful, but the most important parameter to be measured routinely in this case for determination of salvage depths is electrical conductivity.

3 Western Energy has stated that mixing topsoil as described in chapter IV of the DEIS would be impractical. This is probably true. The additional measures agreed to by the company would help reduce erosion off of the reclaimed minesite (see revised text, chapter III, Geomorphology and Soils).

3 include: lower susceptibility to erosion, adequate moisture retention, and a moderate permeability rate which would enhance the leaching of salts.

Sincerely yours,

Acting James A. Rawlings
Regional Director

LETTER I

DEPARTMENT OF HEALTH. EDUCATION. AND WELFARE
REGION VIII
FEDERAL OFFICE BUILDING
19TH AND STOUT STREETS
DENVER. COLORADO 80202

February 27, 1980

OFFICE OF EDUCATION

Mr. Leo Berry, Jr.
Commissioner
Department of State Lands
1625 11th Avenue
Helena, Montana 59601

Dear Mr. Berry:

1 Our office has reviewed the draft environmental impact statement (EIS) on Area B of Western Energy Company's Rosebud mine near Colstrip, Montana. This extension of Area B, according to the draft IES, would not appreciably increase employment or population in Rosebud County, therefore, should not adversely effect the school system.

In view of the above statement, we have no comments to make concerning this project.

Sincerely,

H. John Runkel
Regional Commissioner for
Educational Programs

1 Thank you for your comments.

THOMAS L. JUDGE
GOVERNOR

STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
AGRICULTURE / LIVESTOCK BUILDING [redacted] CAPITOL STATION
HELENA, MONTANA 59601

TELEPHONE:
AREA CODE 406
449-3144

W. GORDON McOMBER
DIRECTOR

March 25, 1980

Mr. Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59601

Dear Leo:

Upon review of the DEIS for Western Energy Company's Rosebud Mine area B Extension we would like to make the following comments.

1 As you are aware, Western Energy and other mining companies have reclaimed lands in the Colstrip area over the past several years. Throughout the DEIS reference is made to reclaiming the mined area to permit grazing of livestock, however, the 110 acres of cropland appears to be left out of the reclamation process. Within the nation, millions of acres of cropland have been lost in the last decade to urban sprawl, mining, and various activities. Since the nation's and the world's food and fiber demands are increasing daily this continual loss of cropland is of serious concern to us. To this end, we recommend that the Department of State Lands consider adopting a policy requiring the croplands which are disturbed due to mining activity be reclaimed to cropland.

To mitigate impacts and to better assure reclamation success we recommend soil resources should be fully salvaged to allow thrity inches of topsoil. Increased sampling and slective placement of soils should also be required to mitigate impacts as stated on IV-6.

Thank you for allowing us to comment on the DEIS and for extending the comment period.

Sincerely,

Gordon

W. Gordon McOmber, Director

WGM/sle

1 Section 82-4-232(8) MCA allows a company to submit plans for alternative revegetation, including cropland, as a postmining land use. The Department cannot require reclamation to cropland.

Western Energy has agreed to maximize soil salvage and selectively replace sandy soils; see revised text, chapter III, Soils.

LETTER K

STATE OF MONTANA
ENVIRONMENTAL QUALITY COUNCIL
CAPITOL STATION
Helena, Montana 59601

Telephone (406) 449-3742

Terrence D. Carmody, Executive Director

GOV. THOMAS L. JUDGE or Designated Representative
Lt. Gov. Ted Schwinden

HOUSE MEMBERS
Debra G. Noble, Chairman
Vernrer L. Bertelsen
Daniel Iverntas
Arthur H. Shedden

SENATE MEMBERS
William L. Hafferman, Vice-Chairman
Mike Anderson
Harold Dover
Bill Thomas

PUBLIC MEMBERS
Frank Dunkle
Bob Kiesling
Doris H. Milner
Norma Starr

February 15, 1980

Mr. Leo Berry
Commissioner
Department of State Lands
Helena, MT 59601

Dear Mr. Berry:

1 This will acknowledge receipt of the draft environmental impact statement on Area B Extension Western Energy Company's Rosebud Mine.

We appreciate the opportunity to review this document.

Sincerely,

Terrence D. Carmody

TERRENCE D. CARMODY
Executive Director

TDC:es

1 Thank you for your letter.

LETTER L

STATE OF MONTANA

DEPARTMENT OF FISH AND GAME

Helena, MT 59601
March 18, 1980

Mr. Ralph Driear
Department of State Lands
Helena, MT 59601

Dear Ralph:

1 Please excuse my tardiness in commenting on Western Energy Company's Rosebud Mine Area B Extension Draft EIS. A cursory review of the statement leads me to the conclusion that the statement adequately addresses impacts occurring to wildlife resources. However, it could be more firmly pointed out that any wildlife losses are cumulative to those the area has already suffered.

Thank you for the opportunity to review this statement.

Sincerely,

Robert R. Martinka, Chief
Bureau of Baseline Studies

RRM/sd

cc: Keith Seaburg
Dennis Christopherson

1 Impacts on wildlife from Area B, though slight, would indeed add to the existing impacts of mining at Area B and elsewhere around Colstrip. The data necessary to quantify the cumulative impact of mining at Colstrip are not available.

Department of Health and Environmental Sciences
STATE OF MONTANA HELENA, MONTANA 59601

A C Knight, M D F C C P
Director

March 6, 1980

Department of State Lands
Attn: Ralph Driear
Capitol Station
Helena, MT 59601

Dear Ralph:

The Air and Water Quality Bureaus, Department of Health and Environmental Sciences, reviewed the draft environmental impact statement for the Western Energy Area B Extension. Fred Shewman, Water Quality Bureau, reviewed the draft EIS and noted:

> We have had a lot of adverse comments about Western Energy's operations and specifically its impounding water in sedimentation ponds, thus changing the flow regimes of Armells Creek and Cow Creek.
>
> The accusation is that impounding runoff spreads out the seasonal flows in these creeks and causes waterlogging at times when the streams were formerly naturally dry.

1 It seems such a controversial issue as this could be addressed in the hydrology section of the EIS, Chapter III B.

Thank you for the opportunity to comment on the draft EIS.

Sincerely,

Thomas M. Ellerhoff
Technical Writer
Environmental Sciences Division

jg

cc: F. Shewman

1 See revised text, chapter III, Hydrology, ground water section.

MONTANA HISTORICAL SOCIETY

HISTORIC PRESERVATION OFFICE

225 NORTH ROBERTS STREET • (406) 449-4584 • HELENA, MONTANA 59601

February 13, 1980

Mr. Leo Berry, Jr., Commissioner
Department of State Lands
1625 11th Ave
Helena, MT 59601

Dear Mr. Berry:

1 Thank you for the opportunity to comment on the Draft Environmental Impact Statement for Western Energy Company's Rosebud Mine Area B Extension. I concur that the Old Homestead Site and the Well Collected Site are not eligible for listing on the National Register of Historic Places. I also await and look forward to receiving the report of results from the additional survey work we requested.

Sincerely,

Dr. Robert Archibald
Acting SHPO

RA/TF/prb

1 The requested survey work has been completed and has been sent to your office.

DEPARTMENT OF NATURAL RESOURCES & CONSERVATION
CONSERVATION DISTRICTS DIVISION

32 SOUTH EWING, HELENA, MT 59601
(406) 449-5640

THOMAS L. JUDGE, GOVERNOR
TED J. DONEY, DIRECTOR

February 26, 1980

Leo Berry, Jr., Commissioner
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59601

Dear Mr. Berry:

Thank you for the opportunity to comment on the Western Energy Company's Rosebud Mine Area B Expansion Draft Environmental Statement.

Apparently Western Energy Company has not committed itself to using the best technical alternatives in its mine reclamation plan.

1 Creation of complex slopes, selective placement of soils based on textural characteristics, maximum salvage of usable soils, and adequate sampling to prevent placement of potentially toxic materials near the surface are imperative, unless doing so is a physical impossibility. WECO should be required to incorporate these practices in its reclamation plan whenever possible, failure to do so will significantly decrease chances of successful revegetation of the site.

2 Not mining the McKay coal seam is a poor decision in light of the emergy situation and the difficulty of reclaiming strip mined lands.

3 The environmental statement did not provide information, and hence an opportunity to evaluate, the proposed seeding mixture to be used in reclamation, beyond mentioning that it was to be a native grass mixture.

Sincerely,

PETE STRAZDAS
RANGE SPECIALIST, CDD

PT/km

1 Western Energy has agreed to the listed mitigating measures (see chapter III, Geology and Soils). Toxic materials in the overburden do not appear to be a significant problem owing to dilution during replacement of the overburden.

2 Noted.

3 The revegetation plan is part of the company's permit application and is available for public inspection. The technical analysis of the Area B mine on file with the Department discusses the revegetation plan; the plan is too lengthy and complex to reprint in the EIS.

BURLINGTON NORTHERN

LAW DEPARTMENT

176 East Fifth Street
St. Paul, Minnesota 55101
Telephone (612) 298-2121

March 8, 1980

Mr. Leo Berry, Jr.
Commissioner
Department of State Lands
State of Montana
1625 Eleventh Avenue
Helena, Montana 59601

Re: Draft Environmental Impact Statement, Area B of Western Energy Company's Rosebud Mine, Colstrip, MT.

Dear Commissioner Berry:

1 Thank you for providing us with a copy of the above draft environmental impact statement. Burlington Northern must dispute one particular statement on air quality which appears on page IV-7 of the DES.

That statement implies that one percent of unit train coal is lost in transit due to blow-off. This is not true. If it were so, the loss from every 100 car train would be equivalent to an entire carload from that train. This is entirely inconsistent with the experience of Burlington Northern and the coal and railroad industries with Western coal. Western coal, due to its high moisture content, suffers almost no loss in transit.

To validate our contentions, you may refer to the January, 1978 study by the Office of Technology Assessment entitled, "A Technology Assessment of Coal Slurry Pipelines". That study states:

> "The Western Weighing & Inspection Bureau which performs weighing services for western loads, reports that it has received no claims of coal lost in transit. Any difference between the weight of the coal cars at origin and destination which would reflect coal lost, are not detectable. Local officials in Wyoming, Colorado and Illinois, all of which have appreciable coal train traffic report that they have not received complaints of fugitive coal dust emissions." Id., page 142.

For these reasons, we request that you make the appropriate change in the text of the final environmental statement.

Sincerely,

Shirley A. Brantingham
Attorney

SAB/gfa,7

1 The buyers of Montana coal recognize there is some coal lost as dust during transit from the unit trains (Robert Fry, Wisconsin Power and Light, oral commun., March 16, 1980; Dick Stake, Detroit Edison, oral commun., March 24, 1980). Detroit Edison has expressed concern about the coal loss. Although the 1 percent figure is frequently mentioned, no figure has been substantiated by research. The statement on page III-5, last sentence, refers to the maximum potential loss of up to 1 percent; the statement on page IV-7 has been changed to read "...up to 1 percent..."

Owing to the method of calibrating the scales at the mine loadout facility (Dick Spanier, Western Weighing and Inspection Bureau, Minneapolis, oral commun., March 16, 1980), a 1 percent weight difference may not be detectable. This may account for the statement cited from the Office of Technology Assessment study.

PATTY KLUVER
Route 1
Forsyth, Montana 59327
March 6, 1980

Mr. Leo Berry, Jr.
Commissioner, Dept. State Lands
Capital Station
Helena, Montana 59601

Re: Draft EIS -Western Energy Co Extension, Area B.

Dear Sir:

1 A reading of the Draft EIS pertaining to the extension of coal stripmining in Area B, near Colstrip, Montana leaves one with the impression that the contents were put together without much in-depth study, either because the authors were tired of writing Impact Statements, or because they were confident the permit would be approved even before it was compiled!

Be assured, those of us who struggle through such Statements do not find any of them ranked in Best Seller lists. We aren't paid to compile them; nor are we paid to critique them. Our concern is to try to point out to you the very real danger to the eventual welfare of Montana, should mining be approved, and we have little assurance that you will consider our concerns.

2 Page iii, Summary of Impacts: Hydrology--"minimal sediment would be added to East Fork Armells Creek; ground water quality, although degraded, would be in the normal range for undisturbed areas near Colstrip; ground water quantity would not be noticeably affected."

While sediment is somewhat removed from the mine waters which flow into E. Fork of Armells creek, no mention was made of the increase in minerals, sulfate, magnesium, sodium, etc., all of which have increased markedly since the mine was opened again. No tests were made of the water of east fork of Armells creek before Northern Pacific opened a mine there. No tests of any dimension were made until after Mont. Power Co. subsidiaries had been operating the mines, discharging water into that creek, for several years.

3 You must be aware that the wells which once provided the town of Colstrip with domestic water became so unpalatable the they were abandoned, and that Company now provides domestic water from the surge pond?

Will Mont. Power Co. or its subsidiary, Western Energy Co.

1 Your concerns and those of other commenters will be considered before a decision on the permit application is made.

2 There is unfortunately no long term baseline information on the quality of surface waters of East Fork Armells Creek. Although the Rosebud mine is suspected to be slightly increasing the salinity of East Fork Armells Creek and Cow Creek east of the mine, the magnitude of the increase cannot be determined from existing data. Western Energy has agreed to release impounded water from Area B within 15 days of large runoff events. This would be better than permanently retaining large volumes of runoff which could increase salinity in surface and subsurface waters (see revised text, chapter III, Hydrology).

3 According to Nollan Fandrich of Western Energy (oral commun., April 21, 1980), seven domestic water wells produced a limited supply of water for the town of Colstrip. When Montana Power Co. piped in water from the Yellowstone River for the Colstrip power plant, the town hooked up to the Yellowstone supply in order to meet the increased demand, not because the existing wells became unpalatable. Four of the seven wells are still used by Colstrip during peak summer demand; the other three wells were abandoned when the town expanded over them.

PATTY KLUVER
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Forsyth, Montana 59327

provide water from the Surge Pond for all who'se domestic water source has become unpalatable? Ranchers in the area of Colstrip are finding it necessary to drill new wells to deeper veins for household use, and the numbers are increasing daily. The well we were forced to drill on this ranch went to a depth of 840 ft. Is the Mining Company prepared to pay those costs?

The paragraph pertaining to Hydrology quoted from the Summary should be stricken. It is composed entirely of "wishful thinking."

Page iii, Summary of Impacts: Air Quality--the mine would continue to contribute slightly to the already reduced air quality in the Colstrip "nonattainment area." Local residents and mine workers would occasionally be exposed to potentially hazardous concentrations of particulate. These impacts could be mitigated.

The mining of coal in the extension of Area B will contribute more than slightly to the already reduced air quality. If the impacts could be mitigated, why aren't they? If the Company won't cover the coal piles next to the tiple, of their own volition, they could be forced too, and it is long past time when the State should have taken action.

Page iv -Land Use: the mine would not appreciably affect the existing land use pattern in Rosebud County. About 1,366 acres would be removed from livestock grazing during mine life.

If there has been one single acre of land prevent to pre-mining productivity in the Colstrip area, it has been kept a secret. Yet, Western Energy Company has been operating for 10 years at that site. Therefore, that entire paragraph is erroneous, and should be re-written truthfully.

Under the Irreversable and Irretriev ble Commitments of Rsources: (p-V) paragraph 3,"This continued use would not conflict with existing water rights or uses." This claim has not been substantiated, and evidence has been accumulating which indicates it is entirely false.

....."Mixing of the stratigraphy and soil horizons would adversely affect hydrologic conditions and plant growth, but the effect would not be severe." In an arid region such as that of the proposed mine site, a little disruption of the hydrology, or a little hindering of plant growth will cause severe adverse effects.

3 The mining company is obligated to replace any water source that is proven to be lost or degraded as a result of mining.

4 Western Energy does not now have an air quality permit; the last sentence of the first paragraph on page IV-2 has been deleted. In accordance with the State of Montana air quality rules adopted in April 1979, Western Energy must apply for an air quality permit by January 1, 1981. Enclosed coal storage could be a stipulation for permit approval.

5 See chapter III, Land Use for an explanation of the summary statement on page iv. The intended use of the postmining surface is livestock grazing.

6 Western Energy has recently supplied more accurate figures on water consumption at the Rosebud mine (see response T4). The 69 acre-feet used at the Rosebud mine (about one-third of which would be used at Area B) could slightly reduce flood flows in East Fork Armells Creek. This would slightly reduce the area that could be flood irrigated (see revised summary and revised chapter III, Hydrology, surface water section).

The 10 acre-feet used by Area B employees for domestic purposes would have little if any effect on existing or future uses. Consumptive use of water in Forsyth and Colstrip is well below current water rights for those towns. See fig. IV-2 in FES 80-1, vol. 1 (U.S. Department of the Interior and Montana Department of State Lands, 1980).

7 Initial tests of grazing are now being conducted at Area A of the Rosebud mine. Some grazing would be available at Area B within about 3 years of initial seeding. The long term success of reclamation is neither proven nor disproven.

3

PATTY KLUVER
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Forsyth, Montana 59327

7 No grazing on the lands will be available for many years, scores of years, or Centuries. Mineralized water will lessen plant health on site, as well as down stream from the site. Dustbowl conditions from the entire mine area could result in utter destruction of land far afield from that addressed. In fact, that picture of the future is more likely than that portrayed in the Draft EIS, Area B Extension. Of course, the taxable valuation of the land is gone. Can the Coal Severence Tax cover the loss to Montana? . . for scores of years, or longer?

8 The mining plan pictured P. I-2 appears to be exactly opposite of past mining plans. In this sequence, mining would begin close to the alluvial valley, and follow it the length of the area. In past editions from WECo, the mining sequence appeared to work across the coal bed, rather than along it's length. Why is this?

9 Is it possible that the mining Company has discovered they would intercept less ground water at any one time, if the mining proceeds in the plan pictured?

10 Chapter II. p.1 -2. Overburden: This paragraph sug ests there is need for pause, if Molybdenum, Cadmium, Zinc, Salt, and Clay exceed State suspect levels. How does the mining company propose to explain them awa ? What will the State Land Department require, or is this contamination to be discharged from the holding ponds located next to the E st Fork of Armells creek valley floor? Will the holding ponds be of the same type as the past constructions were, using rock "fill" so that they leak and leech into the waters of Armells Creek. That way, they will not constitute a hazard to the mine operation, but what about those residences and businesses down stream? ? ?

11 How can there be any discussion of what constatutes the alluvial valley floor? Logic should tell one, the floor extends the width of the alluviam Pp. I-5-6.

12 Most of the Ground Water Chapter is suspect, largely because the references used were suspect, and have certain extremely "improbable" assumptions, probably because those conducting the study were in the employ of the Mining Company. It is difficult to remain objective under those circumstances.

7 Area B would probably slightly increase the salinity of East Fork Armells Creek, which could slightly reduce vegetative productivity downstream from the mine--but not at the mine site. The reduction in productivity is not expected to be severe, although effects from the entire Rosebud mine could be noticeable. A study which would better quantify the effect is outlined in Chapter IV, Mitigating Measures, hydrology section.

Dustbowl conditions on reclaimed areas are possible during a severe drought; such a drought could induce dustbowl conditions on native rangeland as well. There is no basis for predicting such a total failure of reclamation at Area B.

The annual return to the State in interest on the contribution of coal severance tax from Area B to the trust funds would be far greater than the property taxes paid on the reclaimed land. The State could decide to transfer a portion of the income from the trust funds to the county in the event of a loss in taxable valuation.

8 Western Energy probably planned the orientation of the mine pit and the sequence of mining for the following reasons: by mining areas of lower overburden first, the proposed layout would maximize economic returns at the start of mining; the dragline would work along topographic contours instead of up- and downslope which would be impractical; and the initial pit layout would aid expansion into sections 7, 8, 17, and 18 if such expansion is eventually applied for and approved.

9 Because of the relatively small amounts of ground water in the vicinity of Area B, it is unlikely that Western Energy designed the alignment of its pits to minimize pit inflow.

10 Paragraph 6 on page II-1 states that reclamation and postmining land use may be affected if spoils with values above suspect levels are moved near the surface. The company would be required to replace overburden so that there is a buffer zone of favorable materials between the surface and any materials which would adversely affect reclamation or ground water.

The sediment ponds would slowly seep water into the East Fork Armells Creek gravels; the effects of that seepage are discussed in the revised chapter III, Hydrology, surface water section.

11 "Alluvial valley floor" (AVF) as used in this EIS is a legal determination by the Department of the Interior and the Department of State Lands using geomorphic, hydrologic, and land use criteria. The presence of alluvium in the East Fork valley does not necessarily mean that it will be designated an AVF. See revised text, chapter III, Hydrology, ground water section.

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Forsyth, Montana 59327

4

13 P. II-5, the last paragraph: . . ."The interburden between the coal seams varies in thickness throughout the area, is composed of clay, silt, and sand beds, and commonly acts as at least a partial hydraulic barrier to vertical ground water movement.

It was with pleasure that this was read, since logic told the writer the ground water from the Rosebud vein would not, as was suggested in previous Environmental Impact Statements, drop down to a lower aquifer. So, what will happen to the water that formerly traversed the Rosebud coal vein?

14 You must be aware that the State of Montana has requested that it's citizens file new Use Rights to the wells and springs of this area. If the mining of the coal in Area B, or in any other area, intercepts the water to those wells on the down-gradient, who will be responsible for replacing the loss?

15 On at least three occasions in this epistle, the remark was made that the lands in the proposed mining area had been overgrazed, to the extent that it has a climped a severance.

Whoever masterminded that accusation deserves to be called into court to answer Libel charges. You know of the severe drought conditions in Southeastern Montana, last year. You know of the severe grasshopper infestation, and, YOU have seen the picture in the Final ~~Draft~~ Statement, Northern Powder River Basin Coal, Montana (Page II-37). That is why the vegetation is not doing well, because that area has been deluged with dust for a number of years, coal dust, haul road dust, mine dust, etc.

In conclusion, the EIS is made up of the same old propaganda contained in earlier editions. One day, when it is probably too late, the State of Montana will realize what it has done to this region. Who, among the political leaders of today will be ready to take the blame. It will be like shutting the barn door after the horse is gone, anyway.

Sincerely,

Patty Kluver

12 The suspect references and improbable assumptions are not identified; therefore, no response is possible. Although this EIS is paid for by Western Energy Company as required under State law, none of the contributors to the EIS were or are employees of Western Energy, nor do they have any vested interest in the approval or denial of the permit.

13 The DEIS stated that the interburden acts as a partial barrier, not a total barrier; some ground water probably moves through the interburden. After mining, as the potentiometric head in the spoils recovers, some downward ground water movement will likely be reestablished, as will horizontal ground water flow approximately equivalent to the premining direction toward East Fork Armells Creek and east toward tributaries of Rosebud Creek (such as Cow Creek).

14 Western Energy Company would be responsible under State law.

15 Nowhere in the EIS is it stated that the area proposed for mining has been overgrazed. The proposed permit area has been heavily grazed (see Western Energy comment T31) which has reduced the value of area for wildlife, domestic grazing, and esthetics. Low precipitation in 1979 and grasshopper infestations further reduced vegetative cover. The DEIS does not accuse anyone of mismanaging the area; it simply points out the current condition of the range, whatever the cause.

LETTER R

The Montana Environmental Information Center

• P.O. Box 1184, Helena, Montana 59601 (406) 443-2520
• P.O. Box 8166, Missoula, Montana 59801 (406) 728-2644

March 10, 1980

Leo Berry, Commissioner
DSC Dept. of State Lands
Capital Station
Helena MT 59601

Dear Mr. Berry

Although E.I.C. appreciates the Departments attempts to be clear and concise in the environmental statements, it appears that accuracy has been lost in the process. The following represents our comments on the Area B EIS.

1 Page iii - Soils and Vegetation; the implication here is that the area should not be top soiled. Surely, this is not what the Department had in mind.

2 Page iv - Wildlife; This statement must be incorrect, because if more suitable habitat were available near by, either that habitat would be filled or, the wildlife species being referred to would already be in the more suitable habitat and not in Area B.

3 Page iv - Cultural resources; it would appear that the Department has been unable to fully evaluate the cultural resources of the area. As such mining could not be permitted to continue in Area B until these resources have been identified and mitigated.

4 Page v - last paragraph; This statement implies that reclamation will be successful. This has not been demonstrated, to date, in the Northern Powder River Basin

5 Chapter I - This chapter appears to be seriously deficient. It lacks a map of both the premining and post mining topography as well as a proposed seed mixture. Is there some compelling reason why E.I.C. and other readers are unable to evaluate these critical portions of the reclamation plan?

Chapter III - This chapter appears to be somewhat inaccurate. If these inaccuracies permeate the statement, it is necessary to rewrite the draft for example:

6 Page III - 3 second paragraph last sentences, A determination of potential impact should be identified with the EIS. Potential impacts exist, regardless of names given to the valley floor of East fork.

7 Page III - 4 Third paragraph - This statement hastily skips through any mention of geomorphic instability. Is there something about instability that is being kept from us? Why would the area have problems with stability?

1 The statement on page iii is not intended to mean that topsoiling is bad. The company is required by law to salvage and replace topsoil. The statement referred to a part of the reclaimed surface along the reduced highwall that would have been be affected by high erosion and sedimentation rates. The company has since revised its reclamation plan to minimize those problems (see revised text, chapter III, Geology and Soils).

2 The few animals observed on Area B were probably not residents. Because wildlife habitat on and adjacent to Area B is marginal, movement across the boundaries of Area B would be expected. More suitable habitat or substitute habitat is located in the breaks and drainages southeast and north of the mine.

3 The necessary cultural resources surveys have been completed; see response A1 and chapter II, Cultural Resources.

4 The statement refers to the fencing out of livestock during initial reclamation. Such initial reclamation is underway at the Western Energy operations.

5 See response 03.

6 The most likely disturbance to the alluvial ground water system underlying East Fork Armells Creek would be a slight lowering of the alluvial water table in the immediate vicinity of the mine pit during and shortly after mining. The extent of this impact has not been determined; the Department of State Lands and the Office of Surface Mining are continuing their investigations. See revised Hydrology text in chapter II.

7 The cited paragraph is a summary. Detailed analysis of geomorphic impacts is found on page III-1.

LETTER R

8 Page III - 5 Under what air quality permit is WECo allowed to have uncovered storage piles? As this is a non-attainment area, cant WECo be required to cover their stock piles?

9 Page III - 7 Will WECo be required to do supplement soil sampling to maximize salavage? If not, why not?

10 Page III - 9 first paragraph; Documentation is lacking for the statement that grazing would not be greatly curtailed following mining. Furthermore the following paragraph contradicts this paragraph.

11 Page III - 10 Wildlife- Again, if suitable habitat is available in adjacent areas, why aren't wildlife there, instead of in Area B?

In closing it appeared that this statement has been too hastily written, with little thought given to accuracy. We are disappointed and hope that this EIS is not a sign of things to come.

Sincerely,

John L. Wilson

John L. Wilson

8 See response Q4.

9 Western Energy has agreed to do additional soil sampling to maximize soil salvage; see revised text, chapter III, Soils.

10 The cited statement is a projection based on the best available information from the admittedly few years of experience with modern reclamation. The following paragraph does not contradict the summary paragraph; it simply points out possible difficulties with vegetation establishment which would have to be corrected for reclamation to succeed. Additional explanation has been added to the first paragraph of chapter III, Vegetation.

There is no basis for predicting reclamation failure after final bond release--the reclaimed land would be more resistant to failure then than in the first few years following revegetation.

11 See response R2.

NORTHERN PLAINS RESOURCE COUNCIL

Main Office
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Billings, Mt 59101
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Field Office
P.O Box 886
Glendive, Mt 59330
(406) 365-2525

Mr. Ralph Driear
Environmental Administrator
Department of State Lands
1625 Eleventh Avenue
Helena, Montana 59601

RE: Area B Extension

Dear Mr. Driear,

The Northern Plains Resource Council takes this opportunity to briefly comment on Western Energy Company's Rosebud mine: Area B Extension, Draft EIS.

1 When utilizing the projected figures for production and consumption as stated in the Area B DEIS, there seems to be an approximate 3.6 million ton/year surplus by 1985-86. Based on these figures, the Council questions the need for the Area B Extension.

2 We would like to point out that Western Energy at this time does not have an air quality permit. (see p. IV-3. 2. DEIS) While the Colstrip area has been designated as a "non-attainment are", Western Energy has until January 1981 to apply for such a permit. It should be noted that Colstrip residents are presently being exposed to levels of atmospheric particulates which exceed the Federal primary air quality standards established to protect human health. With this in mind, and considering the aforementioned non-attainment status, it would seem to be in accordance with the intent of the air quality bureau that Western Energy file for an air quality permit in conjunction with further mine expansion. (As other area mines have done)

3 While on the subject of air quality, it is stated on page III-5 that the transfer and storage of coal would account for over 700 tons per/year of particulate emissions. We submit, that if Western Energy were required to cover their coal storage piles, as virtually every other large mine in the state covers theirs, that much of this tonnage would be eliminated.

1 The apparent "surplus" is due to several typographical errors. Total consumption by generating units 1-4 would be 8.1 mty, not 6.1 mty as stated on page I-4. The total Western Energy production figures on page I-3 include amounts for the Corette plant in Billings (600,000 tons) and various Great Lakes consumers (700,000 tons) from Areas D & E. The Northern States Power figure for 1985 should be 5,500,000 tons, not 5,000,000 tons.

2 See response Q4.

3 Noted.

LETTER S

Area B Extension comments Continued.

4 Since the East Fork of Armells Creek might possibly be designated an Alluvial Valley Floor, we would like to see the department take measures prior to any permit decision, to determine what the potential impact from Area B might be. We would expect that any determination of potential impact would include both on and off-site impacts.

5 Also, the effect of having post-mining runoff two to five times greater than pre-mining runoff would be to increase the amount of water discharging into the flow system of Armells Creek, and thereby increase the problem of waterlogging downstream.

6 In closing, we submit that the final mine plan should not be approved, unless the recommendations made under technical alternatives (IV-4C), particularly as they relate to soils and geomorphology, are implemented.

Thank you for this opportunity to comment.

Sincerely,

Russ Brown

Russ Brown
NPRC Staff

4 The Department is presently engaged in such investigations, and appropriate determinations will be made prior to any permit decision. See response R6 and revised text, chapter II, Hydrology.

5 See response F1 and revised text, chapter II, Hydrology.

6 Western Energy has agreed to all but one of the proposed mitigating measures for soils and geomorphology. The exception is the proposal for mixing soil in stockpiles, which does not appear to be practical, and, in light of the other agreed-upon measures, may not be necessary.

LETTER T

WESTERN ENERGY COMPANY

404 N. 31st / BILLINGS, MT. 59101 / (406) 252-2277

March 7, 1980

Mr. Leo Berry, Jr.
Commissioner
Department of State Lands
Capitol Station
Helena, MT 59601

Dear Leo:

The Operations and the Resource Development Departments of Western Energy Company, comprised of Engineering, Environmental, and Reclamation people, have reviewed the Draft Environmental Impact Statement covering the "Western Energy Company's Rosebud Mine Area B Extension". The staff respectfully submits the attached comments regarding the draft EIS.

The purpose of submitting the attached comments is to clarify certain points brought out in the draft EIS that may well be misunderstood and/or misinterpreted. Western Energy personnel believes that complete understanding of the draft EIS is essential for proper evaluation of Western's Extension in Area B.

I would like to stress the point that Western's personnel are available at all times to your staff to clarify any and all matters concerning Western's Operations at Colstrip. Western's personnel are also available to clarify points brought out by these comments and also in preparing the Final Environmental Impact Statement.

Thank you for your consideration of Western's comments concerning this draft EIS.

Yours truly,

Mike

Michael W. Shea
Permit Coordinator
Montana-Wyoming Operations

MWS/ct

WESTERN ENERGY COMPANY
Comments of "Western Energy Company's
Rosebud Mine Area B Extension"

Summary of Impacts

1 Page iii, Para. 3:

It is stated that "impacts on geomorphology, soils, and vegetation would be significant because the company's mine plan would not minimize avoidable erosion and maximize vegetative growth". The same statement is made in several places in the DEIS. It is never explained how this conclusion was reached.

The statement is especially significant when one considers that a major tenet of a reclamation plan is to minimize erosion and maximize vegetative growth and productivity. If the referenced statement could be supported by fact, that alone would seem to be sufficient reason to reject the mining application. In an attempt to determine how this conclusion could be reached based on the information presented in the EIS, it became apparent that it was based on the assumption that "sandy topsoil" may be replaced on the reduced highwall. It was further assumed the redistributed materials would erode following runoff events. It was then concluded this material would be deposited on lower slopes resulting in inhibited vegetative development. All conjecture - no fact.

The fact is that nowhere in Western's reclamation plan was it stated that sandy soil materials would be used in reclaiming the final pit area. It is, in fact, extremely improbable that such materials could be used because very little of this type of topsoil is found in the highwall reduction zone. This is readily apparent from the soil survey which was included in the application.

It can only be said that the referenced statement is a conclusion based solely on conjecture. The statement should, at the least, be completely explained. Better, it should be eliminated.

2 Page iv, Para. 2:

Under social and economic conditions it states an increase in employment and population. Western's extension into Sections 4, 9,

1 The impact analysis has been changed to reflect revisions in Western Energy's reclamation plan. Sandy soils would not be placed on the reduced highwall as originally proposed. See revised summary and chapter III, especially the sections on Geology, Soils, and Vegetation.

2 Secondary employment is projected to increase even though direct employment at the mine would remain the same. Population would grow in response to the secondary employment increase. See chapter III, Economics, employment and income section.

2 and 10 will not cause an increase. Employment will remain the same.

Irreversible and Irretrievable Commitments of Resources

3 Page v, Para. 2:

Based upon Western's past-operative data, at an average annual coal production rate of 3 million tons, approximately 12.2 million KWH of electricity, 0.7 million gallons of diesel fuel, and 48,000 gallons of gasoline would be used at the mine each year. Based on 3 million tons, 12.2 million KWN of electricity, 0.7 million gallons of diesel fuel, and 48,000 gallons of gasoline, total direct energy used at the mine amounts to approximately 0.29% of the energy equivalent of the coal. It is not known how much energy is consumed by rail shipment, but if the figure of 7% used in DEIS is correct, 6.71% would be used by rail shipment.

4 Page v, Para. 3:

The statement is made that "About 100 acre-feet/year of water would be consumed at the mine; ..." In trying to find the source of this statement, we were advised by a member of the EIS team that the figure was taken from Westmoreland Resources application for the Absolaka Mine. The information has absolutely nothing to do with Western's application; yet it is presented as fact. The EIS team made an unqualified assumption. They assumed water consumption at the Rosebud Mine and the Absolaka Mine are the same. Whether they are similar or not is a mute point. The fact is that information was incorrectly used, is misrepresented, and is misleading to lay people who will review the DEIS.

The same sentence also indicates 10 acre feet per year of water would be consumed by that portion of the population associated with the mine. In checking out this number, the same EIS team member advised Western it was a "calculated" figure but he did not know the source of the calculations.

Western's concern at this point is how much of this document is based on supported data?

3 The cited paragraph has been revised to show that the total direct energy used to mine and ship the coal to Midwest markets would amount to about 7 percent of the energy equivalent of the electricity generated from the coal.

4 The figure of 100 acre-feet/year of water consumed at the mine was based on a figure of 360,000 gallons of water used on an average summer day (Michael Shea, Western Energy Co., oral commun., November, 1979). This yielded the following estimate:

$$\frac{360{,}000 \text{ gallons/day} \times 90 \text{ days}}{326{,}000 \text{ gallons/acre-foot}} = 99.4 \text{ acre-feet}$$

Western Energy recently stated that the annual water consumption at the Rosebud mine was 69 acre-feet (Michael Shea, oral commun., April, 1980). About one-third of this total is used at Area B. See revised summary and revised chapter III, Hydrology, Surface Water.

Chapter I

Description of the Proposal Under Consideration

A. Scope of the Analysis

5 Page I-1, Para. 3:

Western does not have any Federal mining permits in Area B and none are needed for the current mining operations in Section 3, T.1N., R.41E.

5 Noted.

B. Previous EIS's on Area B

6 Page I-3 Para. 2:

Western can appreciate the Department's desire to make reference to the construction of Units 3 and 4 in describing the general environment. However, there are several instances within the document where reference to this construction can only be considered irrelevant. These points will be addressed in the order in which they appear within the DEIS.

6 The Department's regulations implementing the Montana Environmental Policy Act require the discussion of cumulative impacts. The EIS attempts to show what portion of the cumulative impacts of mining and power generation at Colstrip would be the result of mining at Area B. Without a discussion of the generating units the analysis of Area B would lack a proper context.

C. Western Energy Company's Proposal

1. Summary

Page I-5, Para. 3:

7 According to the USGS, there are only six (6) coal seams underlying the proposed mining area rather than ten (10) as stated in the DEIS. These include, in order from the surface, the Rosebud, McKay, Stocker Creek, Robinson, Burley, and Big Dirty. The Big Dirty seam is in the Lebo member of the Ft. Union Formation and is about 550 to 600 feet below the Rosebud.

7 Noted. The Tongue River Formation contains 10 persistent coal seams; the upper four of those have either eroded or burned at Area B, leaving the six coal seams mentioned in your comment. Text has been changed accordingly.

8 In describing the Rosebud coal, the DEIS authors have confused and interrelated two different analytical measurements. It appears an "As Received" analysis was used for BTU and a "Dry Basis" analysis was used for percent sulfur. The correct analysis (averages) for each measurement is as follows:

BTU:	As Received	- 8,595
	Dry Basis	- 11,645
% S:	As Received	- 0.71
	Dry Basis	- 0.96

8 See revised text, chapter I.

Chapter II

Description of the Existing Environment

A. Geology

9 2. Overburden

Page II-2, Table II-1:

The table as presented is very difficult to read. This is especially true for the clay measurements which make no sense.

9 Table II-1 has been revised.

B. Hydrology

1. Surface Water

10 Page II-3, Para. 1:

"The East Fork has a drainage area of 97.3 square miles." This statement should be corrected to "The East Fork has a drainage area of 97.3 square miles as measured at the USGS measuring gauging station a point 6.7 miles north of Colstrip".

10 The comment is correct; however, for the purposes of this final EIS the drainage area of East Fork Armells Creek above Colstrip was used. That figure is 36 square miles, according to unpublished figures presented to the Department of State Lands by Hydrometrics.

11 Page II-3, Para. 6:

What are the preliminary AVF criteria which are referred to? As this paragraph reads to a layman, it would appear that designation of the East Fork of Armells Creek as an AVF is a foregone conclusion.

11 See revised text, chapter II, Hydrology, surface water section. Designation as an AVF is not a foregone conclusion.

12 Page II-3, Para. 8:

The DEIS cited Van Voast and others (1977) in stating that total dissolved solids in water of the East Fork are about 50% higher downstream from Colstrip than upstream. The DEIS suggests that mining may have caused the decreased quality. Van Voast based his statement on results of eight water samples. Thirty-three water samples collected by Western (1977-1979) show that total dissolved solids average 3920 mg/l below Colstrip, 2725 mg/l within one mile above Colstrip and 3554 mg/l in an area about seven miles upstream from Colstrip. Western would like to know how the Department reached the tentative conclusion that degradation of downstream water in Armells Creek can be attributed to mining in Area B. Two factors are most apparent: 1) such downstream degradation is natural and 2) the town of Colstrip is between the mining area and the downstream monitoring sites. It is Western's opinion that this statement is unsupported

12 For documentation see revised text, chapter II, Hydrology, surface water section.

12 and misleading. As such, it should be deleted from the DEIS.

B. Hydrology

2. Groundwater

13 Page II-5, Para. 2:

The stock well in Section 3 is not within the proposed mining area which is supposedly addressed in this DEIS. Mining in Section 3 is covered under an existing SMP, 76003-A002. It should also be noted that there are actually two stock wells in Section 4 which will be disturbed by mining. The well which is shown has not been used for several years. The well which is not shown is a low yield well (about 1.5 gpm) but has been active as recently as 1979. It is located near the proposed sedimentation pond in the SW¼ of Section 4.

13 Text has been changed accordingly.

14 Page II-5, Para. 3:

The way this paragraph is worded, it is inferred that the McKay coal seam, as an aquifer, will be disturbed or destroyed. The fact is neither the interburden nor the McKay seam will be disturbed by mining. The paragraph should be reworded to make this distinction clear.

14 Text has been changed to show that Western Energy does not propose to mine the McKay seam.

15 It is also interesting to note that the authors apparently feel any water-bearing unit is "important". Other than the fact that they exist, what determines importance?

15 Any water-bearing unit in a semiarid region is important. In addition, Montana's Permanent Regulations under the Strip and Underground Mine Reclamation Act (26.4.314 ARM) require that the reclamation plan "...contain a detailed description, ...to insure the protection of: the quantity of surface and ground water both within the proposed mine plan area and adjacent areas from adverse effects of the proposed surface mining activities, or to provide alternative sources of water in accordance with 26.4.304 and 26.4.648 ARM, where the protection of quantity cannot be ensured." In order to comply with this requirement all water-bearing units must be inventoried to provide baseline data.

16 Page II-6, Paras. 4, 5, 6:

These paragraphs should be deleted completely because they are irrelevant to the issues which are supposed to be addressed in the EIS - impacts attributable to mining in Area B as proposed. It is stated in Paragraph 5 that "Area B is not likely contributing to the problem of waterlogging" along the East Fork Armells Creek downstream from Colstrip. Based on the numerous investigations which have been made because of the described situation, Western would concur with that conclusion. Our question, then, is why is the matter discussed at all? It has no bearing on the issues at hand.

16 The possible effect of mining on the observed waterlogging of hay fields downstream from Colstrip has been raised in comments on this and previous EIS's. See letter 26 in FES 80-1 (U.S. Department of the Interior and Montana Department of State Lands, 1980) and letters F and M in this FEIS. Because of this concern, it is appropriate to address this issue in the EIS.

C. Climate

17 Page II-8, Para. 4:

What is meant by "a high frequency of ... inversions?" When compared to areas in Western Montana (i.e. Missoula), the inversion frequency interval in Colstrip is wholly insignificant.

D. Air Quality

Page II-9, Para. 2:

18 The declaration made in the first sentence of this paragraph regarding deterioration of air quality is erroneous and totally inconsistent with the data presented in Figure II-3 on page II-10. This sentence should be deleted completely. What is the source of Figure II-3 on page II-10? How is "the immediate vicinity of Colstrip" defined as used in the last sentence of this paragraph? Is the proposed mining area included in the "immediate vicinity?" If not, the statement is not relevant.

19 Violations of standards for total suspended particulate (TSP) are discussed. Although, not specifically stated in the DEIS, Western assumes that the measurements described are taken from hi-vols MP-3, WE-1 and WE-2. Western suggests that the authors point out that these hi-vols were not located in accordance with criteria by the U.S. Environmental Protection Agency in "Ambient Monitoring Guidelines for Prevention of Significant Deterioration." It is important to note also that the EPA designated the Colstrip area as non-attainment for TSP on the basis of one sampler (MP-3) in Colstrip, which does not meet the siting criteria.

20 The DEIS notes that Western intends to petition the non-attainment designation. Western has subsequently (December, 1979) submitted the petition to the Montana Air Quality Bureau and the U.S. Environmental Protection Agency.

21 Page II-9, Para. 3:

Reference to the construction of Units 3 and 4 and increased mining attributed to Units 3 and 4 is not relevant to this DEIS. None of the coal to be mined in the proposed mining area will be used at the mine-mouth generation complex.

17 During a 1-year sampling period starting November 13, 1971, "...only 2 near-dawn temperature soundings out of the 169 made did not have a ground-based inversion." (Super and others, 1973, p. 79). The 98.8 percent of the measurements which had a ground-based inversion is what is meant by a high frequency of inversions. Furthermore, Western Energy's permit application for Area E submitted to the Department on November 16, 1979 states on page B-4, "Data from the meteorological tower at Colstrip indicates inversions are very frequent."

18 Figure II-3 shows data from the MPC #3 site in the town of Colstrip. Those data most accurately represent ambient air conditions in the town, as stated in the DEIS. Area B could potentially add to air pollution in Colstrip, although its contribution is not known. For this reason the air quality of Colstrip is relevant to the analysis.

Figure II-3 shows that the geometric mean for the period 1972 through 1973 averaged 55 ug/m^3 and did not exceed the Federal secondary ambient air quality standard (AAQS) of 60 ug/m^3. For the period 1974 through April 1979 the TSP geometric mean was about 90 ug/m^3 which exceeded both the Federal primary standard (75 ug/m^3) and the secondary standard. This 64 percent increase in TSP concentrations represents a substantial deterioration in ambient air quality at Colstrip. To avoid possible confusion with the rules regarding prevention of significant deterioration, the first sentence of the cited paragraph has been changed to read "...has deteriorated substantially in the past 6 years."

19 Although not sited according to EPA criteria, the monitors provide the best data available on ambient air quality in the Colstrip area..

20 See revised text, chapter II, Air Quality.

21 See response T6.

22 Page II-11, Table 11-4:

The data presented in this table is interesting but it is not relevant to the pending mining application or this DEIS.

23 Page II-12, Table 11-5:

With the exception of planned use of $CaCl_2$ on permanent haul and access roads, this table is not relevant to the pending mining application or this DEIS.

E. Soils

24 Page II-13, Para. 1:

The undisturbed soils in the proposed mining area would be better described as moderately to moderately-well developed. This limited description is basic on the general lack of argillic horizons in those profiles which show developed B horizons. Cambil horizons are relatively common in the Aridisols which coincides with a moderately developed soil profile.

25 The statement regarding productivity is not correct. The average productivity in Area B is 500 pounds/acre. Even the wetland communities do not produce "1600 to 1800 pounds per acre" as an average. An excellent range condition would not exceed 1500 lbs/acre and Area B is certainly not in excellent condition.

F. Vegetation

26 Page II-16, Para. 1:

It is stated here that "recent heavy grazing has caused the distinctions between rangeland communities to blend, thus decreasing species diversity and severely limiting land use." However, numerous other statements are made within this document which either imply or directly state that Western will never be able to restore the productivity and diversity levels found on the undisturbed surface within the proposed mining area. The referenced statement is also in direct conflict with the stated average productivity of "above 1600 to 1800 pounds per acre."

22 Table II-4 lists dust control measures taken to date. Those measures have not been sufficient to meet the Federal ambient air quality standards (AAQS); therefore, further dust control measures would have to be taken to meet the AAQS.

23 Table II-5 lists anticipated mitigation measures which may or may not decrease particulate emissions sufficiently to comply with the Federal standards.

24 The statement on page II-13 calling the soils "well developed" was made relative to adjacent areas, i.e. Aridisols vs. Entisols. The statement has been changed to read: "Soils in the mine area are poorly to moderately well-developed..."

25 The statement has been changed to read: "Soils have average potential productivity--about 1,600 to 1,800 pounds/acre." That statement is based on figures reported in the Big Horn County Soil Survey for the same soil series and range sites in excellent condition. There is a considerable range in potential productivity at Area B. In favorable precipitation years, potential productivity would range from 1,100 to 2,700 lbs/acre; in unfavorable precipitation years, 600 to 1,800 lbs/acre. The lower figures in both cases are for the Thin Breaks range site and the higher figures are for Sandy range sites, both of which are found in Area B. The remaining range sites found in Area B fall between those figures (Dave Doty, U.S. Soil Conservation Service, Billings, oral commun., March, 1980).

Based on these data, the 1,600 to 1,800 lbs/acre figures given in the DEIS are reasonable. The productivity of range in excellent condition could exceed 1,500 lbs/acre.

G. Wildlife

27 Page II-17, Para. 1:

The last sentence in this paragraph is not correct. It should read: "The area to be disturbed does not include the creek bottom type and only very little of the adjacent silver sagebrush - grassland type."

H. Social Conditions

28 Page II-18, Para. 3:

Even allowing for the negative declaration made in the last sentence of this paragraph, the entire paragraph is not relevant to the pending mining application or this DEIS.

29 Page II-18, Para. 4:

The purpose of this DEIS is to identify and discuss the probably environmental impacts which would result from surface mining within the proposed mining area as defined in the permit application. It is not, or at least should not be, the intent to discuss the relative merits or environmental impacts which may or may not be associated with Colstrip Units 1, 2, 3, or 4 or their attendant construction. A discussion of "noise levels at some placed within generating Units 1 and 2" has absolutely no bearing whatsoever on the proposed mining in Area B. This statement, and other similar statements, should be stricken as wholly irrelevant and not appear in the final DEIS.

1. Economics Employment and Income

30 Page II-19, Para. 3:

What is the source for the average wage figures given in this paragraph? The reader is referred to Table II-8 and II-9; however, the figures stated in the text do not appear in either table. What is the source of the information compiled in Table II-9? It would appear there is something wrong with this table. Is the reader to understand from this table that annual farm income has decreased from $8326 to $949 between 1973 and 1977, while non-farm

26 The word "severely" has been deleted from the cited paragraph. The DEIS does not state or imply that "Western will never be able to restore the productivity and diversity levels found on the...mine area." The second sentence of the last paragraph on page III-9 of the DEIS points out that Western Energy's proposed methods would be more likely to establish a diverse vegetation cover than previous methods. Chapter III, Land Use states that potential productivity would not be significantly lowered. The 1,600-1,800 lbs/acre is potential productivity; the area proposed for mining is not at full biological potential.

27 Correction noted. See revised text.

28 See response T6.

29 See response T6.

30 The source of the information in table II-9 was inadvertently deleted. It is: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System. The figures in table II-9 are in thousands of dollars. The average wage figures were estimated by dividing total income in a particular industry (table II-9) by total employment in that industry (table II-8). For example: total earned income for the mining industry in 1977 was $10,575,000; total employment was 403, hence:

$$\frac{\$10,575,000}{403} = \$26,240.00$$

30 income has increased from $18,730 per year to $41,599 per year in the same period? If this is so, then the average wage for those in mining was $10,575 per annum rather than $26,000 as stated in the test. This table should either be revised, explained, or deleted.

K. Land Use

31 Page II-23, Para. 4:

It is stated that "the normal productivity (carrying capacity) or the (proposed) mine area is average for southeastern Montana, between 0.25 and 0.30 AUM per acre." According to SCS guidelines, an AUM figure of 0.25 to 0.30 is indicative of range in high good condition at the low end of the 15 to 19 inch precipitation zone in this part of Montana.

It is also stated in this paragraph that the present range condition is poor "probably as a result of heavy grazing in anticipation of mining." This is, again, an erroneous and misleading conclusion which should be deleted. The overgrazed range has absolutely nothing to do with present or proposed mining. The Greenleaf Ranch has the agricultural lease in this area and they gave permission to the Colstrip Rodeo Club to use the area. Due to the extremely dry conditions in 1979, the vegetative development was minimal and the steers were left in the area too long.

32 Page II-23, Para. 5:

How did the Department arrive at the conclusion stated in the last sentence of this paragraph? Based on discussions with MSU and U of M staff, Western will counter the unsupported conclusion by contending that the productivity potential of reclaimed lands, under proper management, will equal or exceed that of undisturbed areas in the Colstrip vicinity.

L. Transportation

33 Page II-24, Para. 4:

There are only four railroad crossings intersecting FAP 39.

31 Most rangeland in Rosebud County is in good to excellent condition according to the range resource map in the Rosebud County Situation Statement (U.S. Department of Agriculture, 1975). The potential productivity of Area B would be .35 to .40 AUM's/acre, which is the U.S. Soil Conservation Service guideline for range in excellent condition. The statement linking heavy grazing to anticipation of mining has been deleted.

32 Long term studies would be needed to substantiate the cited sentence; therefore, the sentence has been deleted. Postmining potential productivity could at best be equal to premining potential productivity.

33 The text has been changed to read "four" instead of "numerous."

34 Page II-24, Para. 5:

Mining in the Area B extension will neither enhance nor defer the "dangerous driving conditions" on FAP 37.

34 Traffic on FAP 37 would increase slightly due to secondary population increases associated with continued mining at Area B. Because the road is being improved, its capacity would not be exceeded.

35 Page II-25, Figure II-5:

Railroad crossings are not shown on FAP 39.

35 Figure II-5 has been revised.

36 Page II-27, Para. 1:

A total of 3.5 unit trains/day currently leave the Rosebud and Big Sky mines. Assuming constant production levels at both mines, 1 unit train/day leaves the Big Sky mine and 2.5 unit trains/day leave the Rosebud mine. Three rail crossings intersect FAP 39 between the Big Sky mine and the BN mainline. Trains from the Big Sky mine cross FAP 39 three times on the in-run and three times on the out-run, for a total of six crossings/train. Three crossings are located between the Rosebud mine and the BN mainline; trains leaving the mine cross FAP 39 three times on the in-run and three times on the out-run, for a total of six crossings/train.

Total Crossings/Day:

Big Sky - 1 train/day x 6 crossings/train = 6 crossings/day

Rosebud - 2.5 trains/day x 6 crossings/train = 15 crossings/day

TOTAL 21 crossings/day

36 The cited sentence has been changed to read: "About 25 unit trains/week..."

N. Cultural Resources

37 Page II-27, Para. 7:

Section 9, T1N R41E has been resurveyed. No sites were found during the survey.

37 Noted. See revised text, chapter II, Cultural Resources.

Chapter III

Impacts of Western Energy's Proposal

A. Geology

1. Topography and Geomorphology

38 Page III-1, Para. 3:

The comment regarding the inadequacies of Western's mine plan is identical to that discussed in the response to Page iii, Para. 3. The second sentence regarding the 225 acres should be deleted as unsupported conjecture. There is no data or evidence to support the Department's tentative conclusion which essentially predicts a reclamation failure on almost 20% of the proposed mining area.

39 It should be pointed out that Western submitted the permit application and attendant mining and reclamation plans 19 months ago (August, 1978). The plans addressed the regulations and departmental philosophies which were in vogue at the time. Since then, what with staffing changes and changes within the regulations, the philosophies and opinions regarding what is or is not acceptable have changed markedly. In the numerous discussions and meetings between Western and DSL which have been held during the extended application review period, Western has agreed, at least in principle, with every modification the Department has requested.

The subject of complex slopes was not even discussed until January, 1980, and Western agreed at that time to modify its mine plan to reflect reconstruction of this kind of slope configuration. It must be noted, however, that at the time the application was submitted, and even as late as December, 1979, Western was led to believe final slope reconstruction as now desired was not wholly acceptable. It would seem to constitute a gross inequity for the Department to essentially reverse itself through a published draft EIS.

40 The language used in the tentative conclusions in this section of the DEIS would tend to lead the layman to believe Western is attempting to slide a plan through the permitting process which was inadequate when submitted. This is not the case at all and Western requests the language be modified to reflect a clearer picture of the actual situation.

41 The third paragraph in this section regarding potential sediment loading in Armells Creek due to the implied reclamation failure in the final highwall area is interesting. In but four short sentences virtually every possibility is covered. No comment is offered.

38 The text has been changed to reflect Western Energy's revised reclamation plan. See chapter III, Geology, topography and geomorphology section.

39 Complex slopes were proposed in the Draft EIS as a refinement based on new understanding of mining impacts and reclamation techniques. After the Draft EIS was issued, Western Energy agreed to reclaim to complex slopes. The impact analysis has been revised accordingly.

40 Western Energy's permit application for Area B was accepted as complete in October, 1980, but that does not mean the application necessarily meets all requirements for approval. Additional stipulations are commonly attached to a mining permit before approval in order to comply with the Montana Strip and Underground Mine Reclamation Act.

41 See the revised text, chapter III, Geology, topography and geomorphology section.

42 2. Overburden

Page III-1, Para. 7:

The regulations are specific regarding the replacement of potentially harmful overburden materials near the regraded spoil surface. Western stated in its application that such materials, if encountered, would be buried under at least 8 feet of non-toxic spoil as required in the regulations. What is the point in implying a limited reclamation effort because of the possibility of "certain overburden materials" being allowed to accumulate near the surface when Western has previously committed to prevent that from happening?

42 The analysis of impacts from overburden constituents is clarified in the revised text, chapter III, Geology, overburden section.

43 Page III-2, Para. 2:

Western does not agree with the stated conclusion reached in this paragraph. How can such a broad conclusion be reached based on the limited data at a single drill site? Western contends there will be no reduction in infiltration and percolation rates nor will erosion and run-off be increased due to clay content found at core hole N44E54.

43 Western Energy has agreed to selectively place clayey material so as not to interfere with infiltration and percolation. See revised text, chapter III, Geology, overburden section.

Page III-2, Para. 4:

The same response stated for paragraph 2 would apply in this case.

44 B. Hydrology

Page III-2, Para. 6:

As noted in a previous comment, there are two (2) stock wells which will be disturbed by mining and will ultimately be replaced as part of the reclamation process. In the third paragraph on Page II-5, the DEIS refers to two stock wells in the proposed mining area (although one actually is not) and then reference is only made to one well on Page III-2.

44 The comment is correct. See revised text, chapter III, Hydrology, ground water section.

1. Groundwater

45 Page III-3, Para. 1:

Reference is made to "only the pit endwall would intercept the flow from the coal seam." By definition, the pit endwall is located at the end of each successive pit. Does the Department mean the highwall? If so, then where is the intercepted water supposedly coming from? Is the reader to assume ground water would be intercepted with each pass?

The statement is also made that "diverted water would be returned to the ground water system in the same vicinity." The "same vicinity" as what? This paragraph requires considerable clarification.

45 Ground water would be intercepted in the Rosebud coal seam both from the highwall and endwall. The influence of this interception, or pit drawdown, would expand as the pit increases in size, although some resaturation of replaced spoils would occur as mining progresses southward. The quoted phrase has been deleted from the revised Hydrology section.

46 Page III-3, Para. 3:

While Western agrees, based on previous and ongoing studies, that groundwater quality will not be significantly changed during mining, the language in this paragraph (sentence) makes no real sense. The paragraph should be reworded.

46 The discussion of ground water quality has been revised. See chapter III, Hydrology.

2. Surface Water

47 Page III-4, Para. 3:

The first sentence is, again, a statement or fact which is unsupported. It may be conjecture that the reduced highwall will be unstable; but it should be stated as such - not as fact. This type of statement can only be considered misleading.

48 The last sentence appears to be inconsistent with statements made in the fifth paragraph on Page III-1.

D. Air Quality

49 Page III-5, Para. 2:

References to the "generating units" is not relevant to this discussion and should be deleted.

50 The assumption that because "significant harm" levels for TSP have been exceeded in past they will "probably be exceeded in the future" is incorrect. Aside from the fact that the statement is unsupportable, it does not take into consideration the planned control measures which will be implemented at least by spring of 1980. Is Western or the layman to in turn assume that the Department is of the opinion the planned control measures will be ineffective?

Page III-5, Para. 3:

Comments concerning Table III-1 are addressed later.

Page III-5, Para. 5:

51 Where is the data which supports David Maughan's statement regarding vertical and horizontal dispersion of dust plumes? The language herein implies that coal dust from the storage piles is deposited up to 7.5 miles from Colstrip. Western does not believe this has been documented and, therefore, the language is misleading.

52 Work by Rao (1971) is cited but Rao is not listed in the references in the back of the DEIS. In what way were dustfall rates measured by Rao similar to those in Colstrip? Where was Rao's work conducted? And under what conditions?

53 The written communication referenced, August 14, 1978, stated that "coal lost in transit is approximately 1%". It does not state

47 See revised text, chapter III, Geology and Hydrology.

48 The statement has been deleted from the revised text.

49 See response T6.

50 Of the control measures proposed by the company, only treatment of haul roads would reduce TSP concentrations at the minesite. Even with the dust control measures already implemented, TSP concentrations at WECO site #4 on the permit area exceeded 1,000 ug/m^3 six times during the last 4 months of 1979. A maximum TSP concentration of 4,430 ug/m^3 was recorded on November 29, 1979 (data on file with the Department of State Lands). Miners are being exposed to potentially hazardous TSP concentrations; the control measures taken by the company have indeed been ineffective in reducing those concentrations. The third sentence of paragraph 2 on page III-5 should begin a new paragraph to make clear that the concentrations exceeding the "significant harm" level are at the mine, not in the town of Colstrip.

51 The data were from NOAA personnel from the Environmental Research Laboratories in Boulder, Colorado (Dave Maughan, oral commun., March 14, 1980). The NOAA group studied atmospheric aerosols at Colstrip for 3 years. The source referred to is the entire Rosebud mining operation, not just the coal storage piles. The fourth sentence of the cited paragraph has been revised.

52 The reference to Rao (1971) has been added to the expanded chapter VI.

As stated in the DEIS, the dustfall rates measured by Rao (2.6 to 541 tons/mi^2/month) are similar to those measured at Colstrip (up to 384 tons/mi^2/month--open file report, Department of State Lands). Rao's work was conducted in Maduadih, Varanasi Province, India under conditions similar enough to the Colstrip area to be applicable. See report for details.

53 that "Unit trains may lose up to 1% of their coal in the form of dust". Western sells its coal f.o.b. If there was significant loss from the unit trains, there would be complaints. A unit train carries 10,000 tons of coal, 1% of that is 100 tons or 1 car load. It is felt that this amount is significant. Western has not received complaints about the loss of coal from unit trains. The 1% used in the letter is an approximation for the amount of coal lost from the time the coal is loaded in the coal haulers until it is delivered to the customer. There are too many unknown factors involved to give the exact amount of coal lost in transit. The first and most important unknown: How much coal is actually loaded in the coal hauler? Without this information, the amount lost cannot be determined. By using the high emission rates in Table III-1, the estimated total amount of coal lost by emissions does not equal 1%. The Table also states that the emissions lost from unit trains is unknown.

54 Page III-6, Table III-1:

There are several figures in the particulate emissions table which should be corrected. Most of the emission factors used in the table were taken from the 1979 EPA Interim Policy Paper. Please note that this policy paper obtained many of the emission factors and ranges of factors from "Survey of Fugitive Dust from Coal Mines", 1978, prepared by PEDCO for the EPA and the EPA recommends the use of PEDCO's factors because they were obtained from actual field studies at five mines, one of which was the Rosebud Mine. Therefore, rather than using the range of factors developed at all five mines, Western feels that it is more appropriate to use only ;the factors derived at the Rosebud Mine. A corrected Table III-1 is enclosed. It better reflects conditions at the Rosebud Mine. Western requests the following corrections be made to Table III-1:

1) Topsoil and subsoil removal and replacement. The emission factor for topsoil removal is .35 lb/yd^3 and .03 lb/yd^3 for replacement (PEDCO, 1978). Most

53 The coal is weighed at the unit train loadout, so the projected 1 percent losses would not include losses from haul trucks. It is true that the amount of coal lost from unit trains is not known with any precision, thus the "unknown" in table III-1; however, the text presents a best estimate of losses "up to 1 percent" based on the admittedly sketchy data. See also response P1.

54 A revised version of the Interim Report entitled "Compilation of Past Practices and Interpretations by EPA on the Air Quality Review of Surface Mining Operations" was issued December 10, 1979. To quote the document (p.4):

> (8) Emission Factors - The state-of-art for emission factors for fugitive dust is extremely limited at present, and additional field studies are absolutely necessary. Those factors which Region VIII believes best represent particulate emissions from mining operations are shown in Section IV of this paper. However, this list is not all inclusive and other representative emission factors can be used after consultation with Region VIII staff. EPA has recently contracted Midwest Research Inc. and PedCo-Environmental to perform a joint study to develop better emission factors for western surface mining operations. This guideline document will be updated to incorporate the new emission factors when they become available in early 1980.

In the revised version of the document there is no recommendation concerning the use of PedCo's site-specific emission factors. Until the new emission factors are available, those listed in the revised EPA report will be utilized. Only for operations not described in that report are other emission factors used.

1) The major source of dust emissions during topsoil removal and replacement is vehicle movement. After the topsoil is dumped, it still must be spread over the recontoured spoils. It is reasonable to assume the motor patrol will produce at least as much dust during this operation as the scraper did during topsoil removal. (EPA 1979b)

2-7) A range of emission factors was used as recommended by EPA (1979b).

6) To quote the PedCo report (p.65):

> Emissions from haul roads seem to be appropriate relative to one another. It was observed that watering may have been done more frequently than normal during the sampling periods at mine C.

The source for the haul road emision factor was EPA (1979b) and was calculated as follows:

54 soil will be replaced behind the pit as it is stripped; therefore, stockpiling and thus emissions are reduced. Total emissions for soil removal should be corrected to 56.7 tons and 4.9 tons for replacement

2) PEDCO (1978) measured emissions at the Rosebud Mine at 14.2 lb/blast for overburden blasting; therefore, total emissions should be corrected to 0.4 tons.

3) The emission factor for overburden removal by dragline at the Rosebud Mine was measured at 0.003 lbs/yd^3. The table should be corrected to show total emissions of 19.5 tons.

4) The emission factor for coal blasting at the Rosebud Mine was determined to be 25.1 lb/blast, for total emissions of 3.1 tons.

5) Coal removal emissions should be corrected to 2.9 tons to reflect PEDCO's factor of 0.002 lb/ton for the Rosebud Mine.

6) Table III-1 shows an emission factor of 8.48 lb/vmt for haul road emissions. The source of the factor was not provided. PEDCO measured emissions of well-watered haul roads at the Rosebud Mine at 3.3 lbs/vmt which would yield total emissions of 254 tons. The figure of 6.6 lbs/vmt for untreated is used as the uncontrolled factor and yields total emission of 508.2 tons.

7) A bottom coal dump emission factor of 0.005 lb/ton was developed by PEDCO for the Rosebud Mine. Using this factor, total emissions would be corrected to 7.3 tons.

8) Western does not screen its coal before crushing, therefore, there are no emissions from screening. A grate separates the coal which will bypass the secondary crusher and it is totally enclosed within the crusher. Western's crushing system is totally enclosed and it is felt that this has the same efficiency (99%) as a baghouse.

9) Controlled emissions for conveyors should be corrected to reflect the fact that conveyors are partially covered. The EPA Interim Policy Letter uses an efficiency of 90% for this control which yields total emissions of 29 tons.

10) Uncontrolled emissions for coal piles were calculated incorrectly. Using the factors and variables provided in Table III-1, uncontrolled emissions for coal storage

54 $$E = \frac{(Ss)}{(60)} \frac{(365-W)}{(365)}$$

where:

E= emission factor; lbs/VMT
S= silt content of road; percent= 27.5
s= vehicle speed; mph= 25
W= mean annual number of days with >.01 inches of rain= 95

$$E = \frac{(27.5 \times 25)}{(60)} \frac{(365-95)}{(365)} = 8.48 \text{ lb/VMT}$$

Haul Road Emissions

An alternative method recommended by EPA (1979b) adds a factor to adjust the equation for the weight of the vehicle. The equation is:

$$E = 5.9 \frac{(s)}{(12)} \frac{(S)}{(30)} \frac{(W)^{0.8}}{(3)} \frac{(d)}{(365)}$$

where:

E= emission rate; lbs/VMT
S= silt content; percent
s= average vehicle speed; mph
W= average vehicle weight; tons
d= dry days/year; <0.01 inches of precipitation

for Western Energy the following values would be used:

s= 27.5
S= 25 mph
W= 131 tons $\frac{\text{weight of coal hauler empty + weight full}}{2}$

$$= \frac{71 + 191}{2}$$

d= 270

$$E = 5.9 \frac{(27.5)}{(12)} \frac{(25)}{(30)} \frac{(131)^{0.8}}{(3)} \frac{(270)}{(365)}$$

= 29 lbs/VMT

There is quite a range of emission rates (8.48-29.0 lbs/VMT) found using the 2 equations. The lower, by a factor of almost 3.5, was used in this analysis.

8) The EPA (Mike Davenport, Air Office, Helena, oral commun., April 21, 1980) concurs that the emission factor of 0.1 lbs/ton is applicable for the sizing (screening) operation at the coal handling facility. The Office of Surface Mining (Floyd Johnson, oral commun., March 31, 1980) is of the opinion that the control efficiency of enclosed crushers is only 50 percent. Table III-1 has been revised to show this new efficiency.

9) The correction has been made.

10) The corrections have been made.

54 would be 27.1 tons and 12.4 tons for the surge pile. However, the emissions should be further adjusted to reflect the climatic factor which is the mean annual number of days with 0.01 inches or more of rainfall (EPA, 1976, "Compilation of Air Pollution Emission Factors") which for Colstrip is 100 days for a climatic factor of 0.73. By multiplying the emissions by this factor, total uncontrolled emissions in Table III-1 would be 19.8 tons for the coal storage pile and 9.1 tons for the surge pile (portions attributed to Area B).

11) The emission factor of 0.204 lb/ton for the coal stacker was based on crushed stone and sand and gravel (EPA, 1976, "Compilation of Air Pollution Emission Factors"). A more correct factor for a coal stacker is 0.0003 to 0.0011 lb/ton (Currier, E. L. and B. D. Neal, "Fugitive Emissions from Coal-Fired Power Plants", presented at the 1979 Air Pollution Control Association Annual Meeting). Using the factor of .001 (which has an above-average validity), total emissions would be corrected to a maximum of 1.5 tons.

E. Soils

55 Page III-7, Para. 3:

This entire paragraph is unsupported. How does not maximizing the soil resource increase erosion and sediment yield and "limit reclamation potential on the entire mine site"? How was it concluded that reclamation requirements would not be met on a portion of the reclaimed surface?

56 Page III-7, Para. 4:

During recent discussions with DSL staff (specifically January 17), it was agreed that the variability of the premine soil resource precludes the possibility of uniformly salvaging the soils. In this paragraph of the DEIS, Western's proposed plan is faulted "due to the lack of uniformity of salvageable soil depth." Western's question is: "Which of the two options available is considered acceptable?"

57 With reference to the "absence of a supplementary soil sampling program", this subject was also discussed at the January 17 meeting between Western and DSL. It was mutually agreed at that time that such a program is needed and Western will submit its proposed program in response to the last set of application deficiencies. The need for the additional sampling was based on the high degree of variability noted in the premine soils in Area B.

54 The 0.204 lb/ton emission rate is the same as that for uncontrolled emissions from all conveyors and
11) transfer points (EPA 1979b). This is a reasonable estimate with which OSM concurs (Floyd Johnson, oral commun. March 31, 1980).

Exposed Area Emissions

Since the DEIS was written, an improved estimate for wind erosion from exposed areas has been made using the equation developed by MRI (Bohn and Cowherd, 1977). Table III-1 and the associated text have been revised accordingly.

$$EF = 3400 \frac{(e)\ (s)\ (f)}{(50)\ (15)\ (25)} \cdot \frac{(P-E)^2}{(50)}$$

where EF= emission factor (lb/acre-year)
3400= an average emission factor based on the reference values found in the denominators of the correction terms
e= surface soil erodibility (tons/acre-year)
s= silt content of surface soil (percent)
f= percentage of time the wind speed exceeds the threshold for wind erosion (12 mph) on an annual basis
P-E= Thornthwaite's precipitation evaporation index, a climatic factor
MRI used the following values:
e= 86 tons/acre-year
f= 30
P-E= 44
s= 10

All but the silt content (s) appear to be based on empirical data. A more realistic value for s would be 27.5.

$$\text{Therefore } EF = 3400 \frac{(86)\ (27.5)\ (30)}{(50)\ (15)\ (25)} \cdot \frac{(44)^2}{(50)}$$

$$= 3400 \frac{(1.72)\ (.08)s}{.7744}$$

$$= 8.307 \text{ tons/acre-year}$$

55 Western Energy has agreed to maximize soil salvage by having a soil scientist in the field to flag salvage depths. See chapter III, Soils.

56 See response T55.

57 Noted. The cited discussion occurred after the DEIS had been sent to the printer.

58 It is stated that increasing the depth of redistributed topsoil from 24 inches to 30 inches "would increase the potential for successful revegetation". According to recently published work by Barth at CSU, the additional soil depth would not significantly increase productivity or development. Part of Barth's work was conducted onsite at the Rosebud Mine. A copy of Barth's report was sent to DSL.

58 Barth's data for 1978-79 indicate that biomass production increased to a depth of approximately 120 cm (47 inches) of topsoil. His preliminary conclusion, however, is that increasing soil thickness above 70 cm (28 inches) has no effect on grass yield. Both depths are greater than the average depth of salvage originally proposed at Area B. See also response T55.

F. Vegetation

59 Page III-9, Para. 4:

The implied reclamation failure on 225 acres is again stated as a fact. However, the Department has no data or evidence to support this conclusion.

59 See revised text, chapter III, Vegetation.

60 Page III-9, Para. 5:

The poor seeding effort at the Rosebud Mine in 1979 is not considered a "revegetation failure" as is stated in the DEIS. The seeding was actually done in the early summer, not in the spring. Field conditions would not allow equipment to operate in the spring. Thus, the seeding was delayed until early summer in hopes of receiving a typical rain (this had occurred in 1977 and 1978). Unfortunately, there were no summer rains in 1979. It is worth noting that the alledged "failure" could have been avoided if the Department was not so opposed to supplemental irrigation for germination. The summer of 1979 would have been the perfect time to use that technique.

60 The 1977 and 1978 precipitation has not been documented as typical. Lack of success of the revegetation, regardless of cause, is still a failure. On July 6, 1978, Western Energy received approval to irrigate 100 acres in Area E. Furthermore, Western Energy recently received approval to implement irrigation as a general management tool to aid in establishing trees, shrubs, and warm-season grasses.

61 Why wouldn't a vegetative cover be established on all retopsoiled lands "during the first few years following mining"? What is meant by "localized failures"?

61 "Localized" means a portion of the reclaimed surface; "failure" means a problem with vegetative establishment requiring corrective action (such as reseeding) to meet reclamation standards. Such failures could be due to erosion problems, germination establishment, weather, or the interaction of any of the above.

62 Page III-10, Para. 3:

At the time Western permit application was submitted to DSL, neither the law nor the regulations allowed the planting of cropland. In addition, the Department was philosophically opposed to such "alternative reclamation". The state law was amended in the spring 1979 session of the State Legislature to allow a mining company to apply for alternative reclamation plans and specifically

62 The cited paragraph simply points out that the wheatfields would not be reestablished; the paragraph was not intended as criticism.

62 addressed hayland, cropland, and pasture lands as alternate postmine land uses.

If the Department would prefer, Western would be willing to submit an application for alternative reclamation to re-establish the 110 acres of wheatfields. However, Western doubts the Department really wants this, for the same reason Western would hesitate to submit such a plan. Western would prefer to wait until more conclusive results are available for ongoing cropping systems research on disturbed sites before submitting an alternate reclamation proposal. Research is presently being conducted at the Rosebud Mine under the direction of MSU personnel to assess the relative merits to re-establish disturbed cropland.

G. Wildlife

63 Page III-10, Para. 4:

The third sentence in this paragraph is incorrect and should be reworded to read: "Use of East Fork Armells Creek by pheasants, waterfowl, and other wildlife associated with riparian habitat should remain the same since the creek bottom plus a 100 foot buffer zone around the creek will not be disturbed."

H. Social Conditions

64 Page III-11, Para. 1:

"Growth due to the mine." Area B is an existing mine and no growth is anticipated.

Page III-11, Para. 3:

Once again Area B is an existing mine and no growth is anticipated.

K. Land Use

65 Page III-13, Para. 4:

The first sentence in this paragraph which references loss of livestock grazing until 1990 and 2000 is totally incorrect. Livestock grazing of revegetated mine lands is a viable and proven management tool. In addition, it is required by regulation. The Department is fully aware of Western's intended management plans based on past and present activities.

63

Correction noted. The cited sentence has been deleted.

64

See response T2.

65 Text has been changed to read: "Mining and reclamation would preclude normal livestock grazing on about 1,366 acres of Area B until the year 2000." Any grazing on reclaimed surfaces before bond release would be more highly controlled than on nearby undisturbed range.

66 In this same paragraph, the references to land lost to livestock grazing due to other parts of the Rosebud Mine, the Big Sky Mine, and construction associated with Units 3 & 4 should be deleted as irrelevant.

L. Transportation

67 Page III-15, Para. 2:

Are we to believe that this 10 vehicles/day increase is attributable to the Area B extension? If so, this is inconsistent with the statement found on Page III-11 under the heading "Economics", "Employment at the mine would remain about the same". If there is no increase in employment, it would be hard to imagine an increase in traffic.

M. Recreation

68 Page III-15, Para. 3:

Again, if the employment in Area B would remain about the same, this increased crowding and litter cannot be attributed to the Area B mine expansion.

Chapter IV

Alternatives to Approving the Permit as Proposed

A. Administrative Alternatives

2. Department of Health and Environmental Sciences

69 Page IV-2, Para. 1:

The DEIS states that the Air Quality Bureau is requiring an air quality permit application from Western and that Western has a permit now. The DEIS authors should correct this paragraph to note that all existing air contaminant sources are required under the Montana Clean Air Act to apply for air quality permits. In Montana, the deadline for filing such an application with the Air Quality Bureau is January 1, 1981. Western wishes to point out that it does not have a permit now.

C. Technical Alternatives

1. Alternative Mining Methods

70 Page IV-4, Paras. 4, 5:

Page IV-5, Paras. 1, 2, 3, 4, 5:

None of the alternate mining methods presented in this section

66 The cited information is relevant for the reasons stated in response T6.

67 The statement on page III-11 was taken out of context: it reads "Employment at the mine would remain about the same, and ancillary (indirect) employment would increase slowly." [Emphasis added] The increase in traffic would be due to the growth in ancillary employment attributable to Area B.

68 See response T2.

69 Correction noted. The cited sentence has been deleted.

70 The discussion is necessary in order to show why alternative mining methods are feasible or not feasible. Without such discussion there would remain questions about their feasibility.

70 are feasible to Western's dragline stripping operation (as is disclaimed in the final sentence of each paragraph). If it is the Department's intention to help Western limit the environmental consequences of mining, it would benefit everyone involved if the discussion of alternatives was confined to just those which are feasible to our operation.

71 The high sulfur content of McKay coal (Dry 1.97%, As Received 1.10%) also prohibits its use for industrial purposes; in addition, the economics of removing 100' of interburden to recover a coal seam 8 feet thick is marginal at best.

3. Additional Mitigating Measures

72 A. Soils

Please refer to previous comments concerning Chapter III, E. Soils, Page III-7, Paras. 3, 4.

73 B. Geomorphology

Please refer to previous comments concerning Chapter III, A. Geology, Page III-1, Para. 3.

C. Air Quality

74 Page IV-7, Para. 5:

The DEIS suggests that Western initiate a monitoring program to determine particulate emissions from the coal handling facilities. Western is expanding its monitoring network and is conducting sample analyses to determine the contribution of coal dust in the samples. Additional field determinations of emission factors from several sources were made recently at the Rosebud Mine by an EPA contractor. The results of this survey are not available at this time.

75 Page IV-7, Para. 6:

Please refer to the previous comments concerning Chapter III, D. Air Quality, Page III-6, Table III-1.

76 Page IV-7, Para. 7:

The DEIS also suggests that coal in the unit trains be treated with hot oil. Western has considered this and other methods. Use of oil may not be a reasonable alternative in view of the

71 It is true that the Rosebud coal is more marketable than the McKay coal; however, the Peabody Coal Company has found a market for McKay coal from its Big Sky mine south of Area B. Based on information submitted in the mine plan application, the McKay seam averages 6.9 feet thick; to reach the McKay seam, Western Energy would have to mine an average of only 16.8 feet of interburden below the Rosebud seam.

72 See responses T55 and T56.

73 See responses T38 and T1.

74 Noted.

75 See response T54.

76 The Decker mine is using a hot oil spray at a coal customer's request. See also response T53.

76 international shortage and economic deterents. At any rate, our observations indicate that emissions from coal cars is negligible. Please refer to previous comment to Chapter III, D. Air Quality, Page III-5, Para. 5.

LETTER T

TABLE III-1.--Estimated potential and controlled particulate emissions from Area B extension

Activity	Extent of activity per year	Emission factor	Uncontrolled emiss. (tons/year) Coal	Other Part.	Ref.	Control used or proposed by Western Energy	Percent efficiency	Controlled Emissions (tons/year) Coal	Other	BACT control strategy	Percent efficiency	BACT Controlled (tons/year) Coal	Other
Topsoil and subsoil													
Removal----------	324,000	.35 lbs/yd^3		56.7	1		---		56.7	---	---		56.7
Replacement-------	324,000	.03 lbs/yd^3		4.9					4.9				4.9
Exposed areas-------	85.9 acres	3.02 tons/acre		259.0	1	Stabilization via revegetation within one growing season	75		64.8	Revegetation within one growing season	75		64.8
Overburden drilling-	1,850 holes	1.5 lb/hole		1.4	1	--	---		1.4	Bag type collector on air drill	90		0.1
Overburden blasting	53 blasts	14.2 lb/blast		0.4	1	--	---		0.4	---	---		0.4
Overburden removal-	13 x 10^6 yd^3	.003 lb/yd^3		19.5	1	--	---		19.5	---	---		19.5
Coal drilling------	8,015 holes	0.22 lb/hole	0.7		1	--	---	0.7	---	Bag type collector on air drill	90	0.1	
Coal blasting------	250 blasts	25.1 lb/blast	3.1		1	--	---	3.1	---	---	---	0.1	
Coal removal-------	2.9 x 10^6 tons	.002 lb/ton	2.9		1	--	---	2.9	---	---	---	3.1	
Haul road traffic--	154,000 vmt	6.60 lb/vmt		508.2	4	Treatment with $CaCl_2$	85		76.2	Treatment with $CaCl_2$	85	2.9	76.2
Coal dumping-------	2.9 x 10^6 tons	.005 lb/ton	7.3		1	--	---	7.3	---	Negative pressure system	85	1.1	
Coal crushing													
Primary----------	2.9 x 10^6 tons	0.02 lb/ton	29.0		1	Enclosed	99	0.3	---	Baghouse	99	0.3	
Secondary--------	882,000 tons	0.06 lb/ton	26.5		1	Enclosed	99	0.3	---	Baghouse	99	0.3	
Conveyors and transfer points--	2.9 x 10^6 tons	0.2 lb/ton	290.0		1	Partial covered	90	29.0	---	Fully covered	100	0.0	
Train loading------	2.9 x 10^6 tons	0.0002 lb/ton	0.3		1	--	---	0.3	---	Retractable chute	95	0.0	
Coal storage-------	3.5 surface acres (33.5% Area B coal)	1.6 u lb/ac/hr	19.8		1	--	---	19.8	---	Enclosed	99	0.2	
Surge pile---------	1.6 surface acres (33.5% Area B coal)	u = 3.3 m/sec	9.1		1	--	---	9.1	---	Enclosed	99	0.1	
Coal stacker-------	2.9 x 10^6 tons	.0003-.0011 lb/T	1.5		2	--	---	1.5	---	Enclosed	99	0.0	
Diesel fuel--------	700,000 gal.	23.7 lb/10^3 gal		8.3	2	--	---		8.3	---	---		8.3
Gasoline----------	48,000 gal.	12 lb/10^3 gal		0.3	2	--	---		0.3	---	---		0.3
Unit trains--------	294												
Distance traveled	82 mile round trip Colstrip to Forsyth	1.07 lb/mile		12.9	3	--	---		12.9	---	---		12.9
Coal transported-	2.9 x 10^6 tons	Unknown	Unknown			--	---	---	---	---	---		
TOTAL			390.2	871.6				743	345.4			5.2	244.10
							Percent Control	794	71.8			89.0	0.01

[1] U.S. Environmental Protection Agency, 1979, Air quality review of surface mining operations interim policy paper, Report VIII

[2] U.S. Environmental Protection Agency, 1976. Compilation of air pollution emission factors AP-42 Part B, Second Edition Research Triangle Park, N.C.

[3] EPA, 1976. Coal Train Assessment, Final report.

[4] PEDCO 1976, untreated road emissions = 6.6 lb/vmt

CHAPTER VI

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